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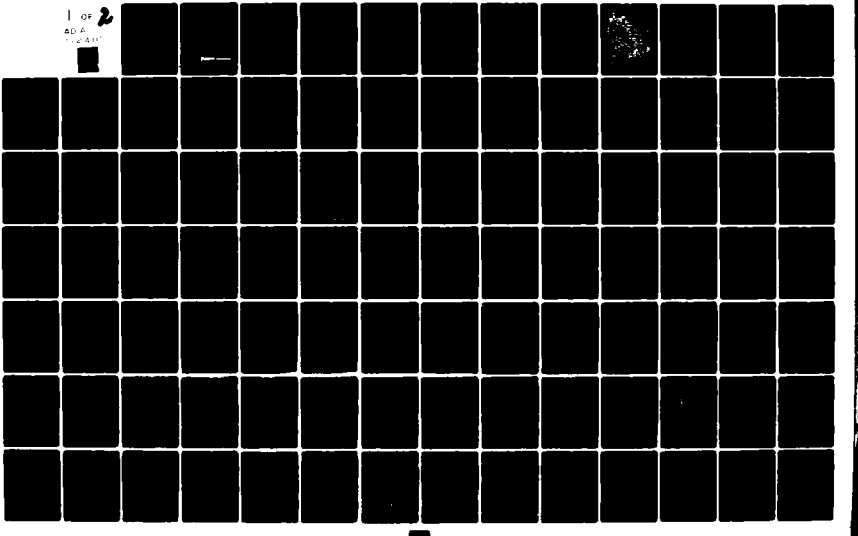

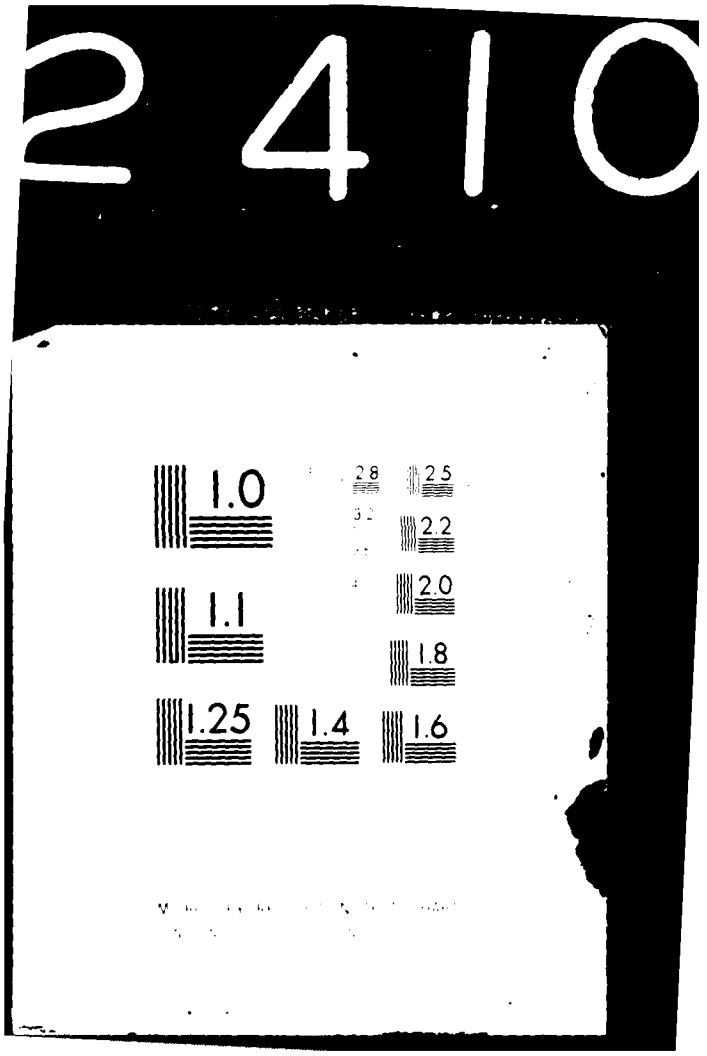
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PROPOSED OPERATIONAL BASE SITE

COYOTE SPRING AND

KANE SPRINGS VALLEYS, NEVADA

Prepared for:

U.S. Department of the Air Force
Ballistic Missile Office (BMO)
Norton Air Force Base, California 92409

Prepared by:

Fugro National, Inc.
3777 Long Beach Boulevard
Long Beach, California 90807

27 February 1980

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number): ~~This~~ report contains preliminary geotechnical data on siting M-X operating base in Coyote Spring and Kane Springs Nevada. Information includes land ownership, terrain and fault conditions, existing and potential water resources. this study was limited to evaluating the relative suitability of this area as a potential operational base using subjective geotechnical criteria. A ground reconnaissance of the potential operational base area has not been made.

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1.0 INTRODUCTION

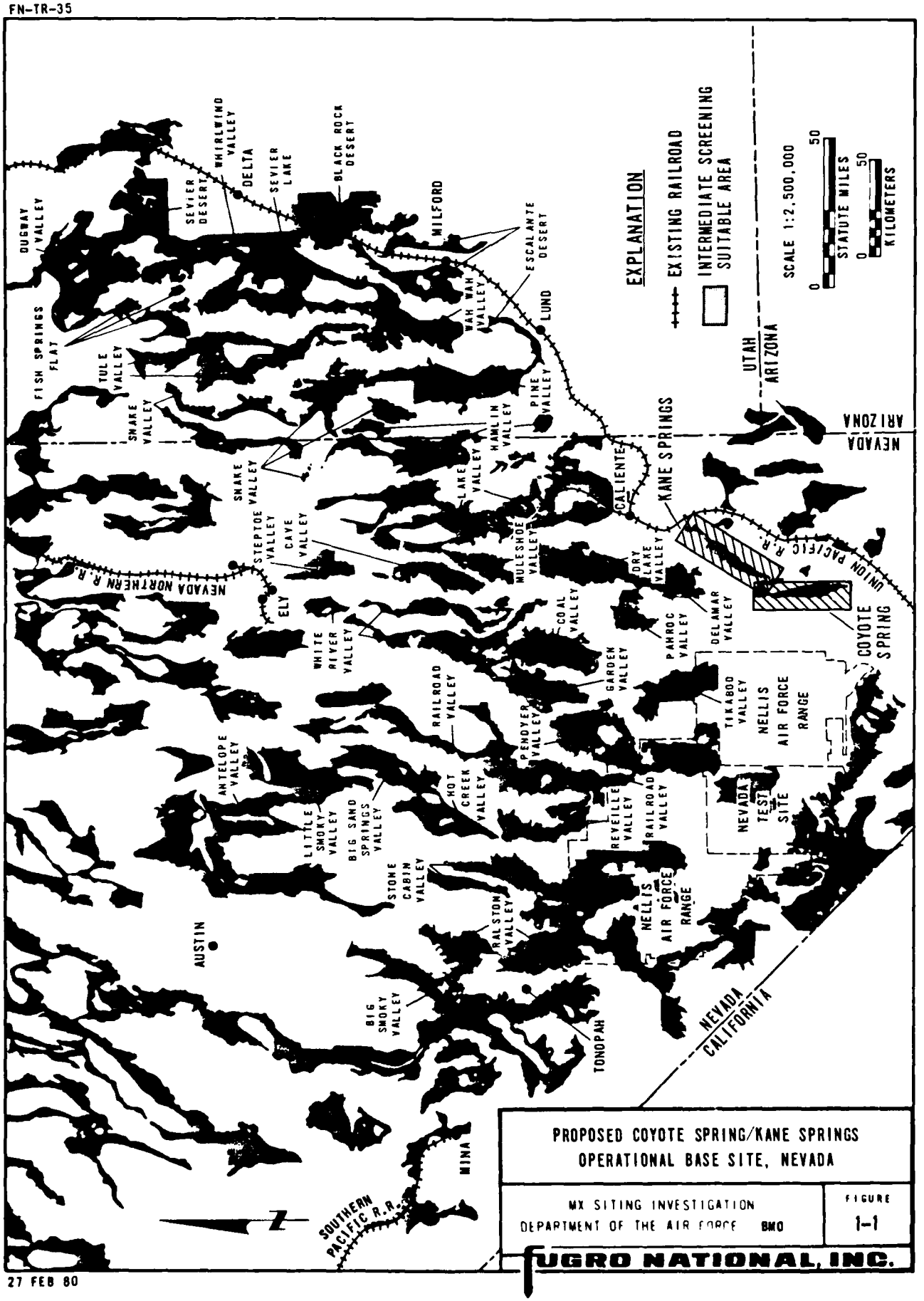
In November, 1979, Fugro National, Inc., was tasked to carry out studies supporting the selection of an operational base location or locations. The studies are to include information about water supply, land ownership, existing and proposed transportation systems, terrain, and geotechnical conditions. Using this information, conceptual layouts are to be prepared showing the operational base, designated assembly area (DAA), missile assembly buildings (MAB), and operational base test site (OBTS).

The original work statement specified that the following areas should be studied:

- Pahroc/Pahranagat Valley region;
- Ely region;
- Delta region; and
- Mina region.

Since the preparation of the original work statement, there have been a number of meetings and discussions concerning the location of the operational base. It was recognized that extensive study would be required before a final selection could be made. It was decided, therefore, that it would be beneficial if Fugro National, Inc. could provide as much information as possible about a number of sites, and do this as quickly as possible. As a result of this decision, a preliminary report titled "Initial Operating Base Report" was submitted on 21 December 1979. Eleven possible sites were identified in that report and various conceptual layout options were presented.

In January, 1980, Fugro National received information from the BMO which stated that Strategic Air Command's (SAC) preference for an operational base was the Coyote Spring and Kane Springs area in Nevada (Figure 1-1). Based on this information, Fugro National began concentrating its studies on this area. In order to submit the data as soon as possible, this report, discussing only Coyote Spring and Kane Springs valleys, has been prepared. Another report on the Milford area is in progress and it is planned to prepare a third report on the Sevier Desert area near Delta.



PROPOSED COYOTE SPRING/KANE SPRINGS OPERATIONAL BASE SITE, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE BMO

FIGURE 1-1

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2.0 SCOPE

The potential operational base area in Coyote Spring and Kane Springs valleys was evaluated to determine its geographic, cultural, geotechnical, and geohydrologic conditions. The geographic and cultural conditions were compiled from Bureau of Land Management master title plats and available topographic maps which were either U.S. Geological Survey 7.5- or 15-minute sheets. The geotechnical and geohydrological conditions were evaluated by a review of geologic and hydrologic literature and maps and by interpretation of aerial photographs (1:25,000 scale). A ground reconnaissance of the potential operational base area has not been made.

This study was limited to evaluating the relative suitability of this area as a potential operational base using subjective geotechnical criteria. This study was conducted without benefit of large-scale topographic maps and does not attempt to determine specific road or railroad alignments, structure location or design, and construction cost estimates. Proposed options for operational base layouts are based on best estimates of the actual conditions on site. The airfield orientation was selected without the benefit of actual on-site wind direction data.

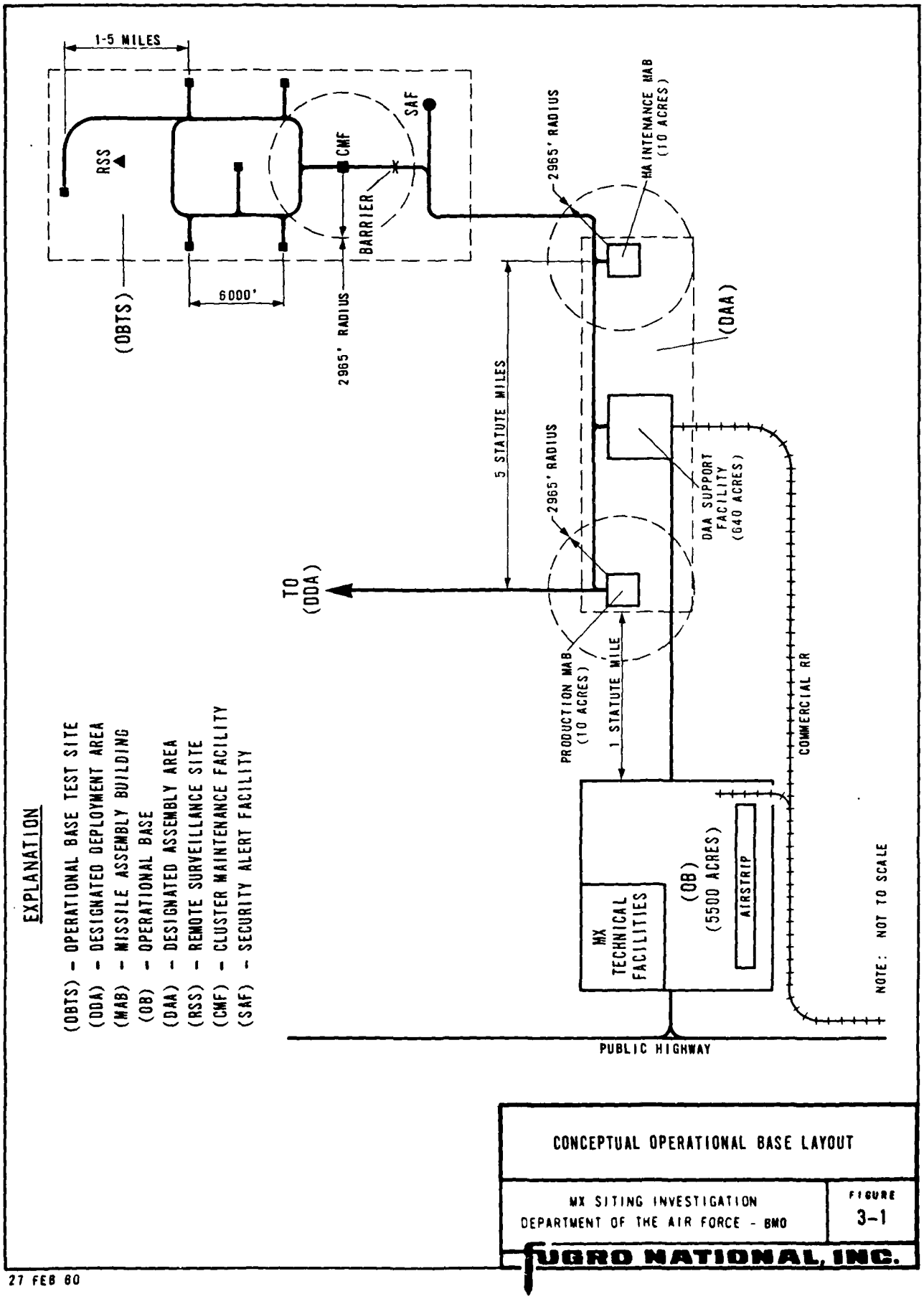
3.0 OPERATIONAL BASE - GENERAL DESCRIPTION AND LAYOUT CRITERIA

3.1 OPERATIONAL BASE STRUCTURES

Conceptually, the operational base consists of three main activity centers; 1) the operational base proper, 2) the designated assembly area, and 3) the operational base test site (Figure 3-1). Each of these centers has an estimated size and, in some cases, a specified distance from other centers or structures.

The operational base (OB) consists of technical facilities supporting the MX System, housing, attendant support facilities, and a 10,000-foot runway. The area needed for these facilities is estimated to be about 5500 acres or 8.6 mi^2.

The designated assembly area (DAA) consists of the production missile assembly building (MAB), the maintenance missile assembly building (MAB), and the DAA support facility. The DAA support facility is estimated to occupy 640 acres or 1 mi^2. It will contain a munitions facility, missile stage storage area, special transport vehicle assembly area, cannister storage, security, and contractor support area. The maintenance MAB and the production MAB each would be approximately 10 acres in area. They would both be situated at least 2965 feet from the nearest structure. The two MABs must be a minimum of 5 statute miles apart, while the DAA as a whole should be no less than 1 statute mile from the OB.



CONCEPTUAL OPERATIONAL BASE LAYOUT

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - BMO

FIGURE
3-1

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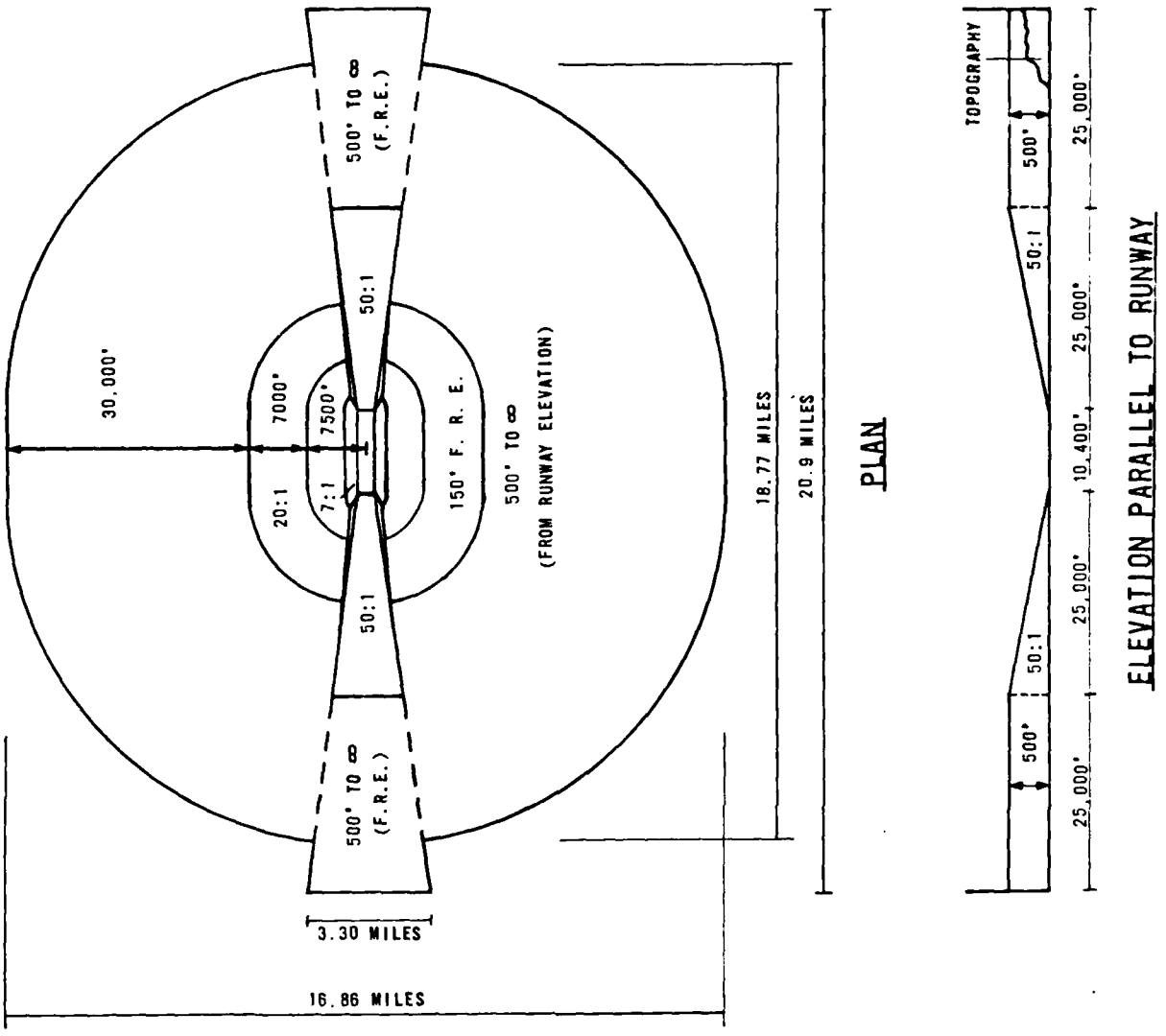
The operational base test site (OBTS) will consist of a security alert facility (SAF) and a test cluster area. The test cluster area will have 1) a road barrier, 2) a cluster maintenance facility, or CMF (situated at least 2065 feet from the nearest structure), 3) five shelters spaced 3000 to 7000 feet apart, 4) a dash track 1 to 5 miles long with a shelter at the end, and 5) a remote surveillance site (RSS).

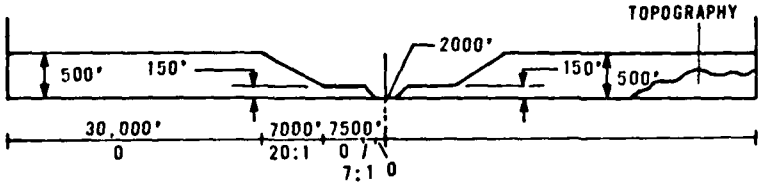
3.2 OPERATIONAL BASE AIRFIELD

The primary concerns in selecting an airfield site are the wind direction, the amount of unobstructed air space, and the flying conditions in the area.

The main runway should be oriented parallel to the predominant wind direction. Minor deviations in orientation are possible if there are problems because of terrain conditions or populated areas on the extended runway centerline. A crosswind runway should not be considered unless wind coverage on the primary runway is less than 90 percent, or when the beam wind component on the primary runway is 13 miles per hour during periods of restricted visibility. An extended meteorological study would be needed to determine these factors.

Airspace around an airfield should be free of obstructions so as to maintain a high level of safety. Criteria for ensuring unobstructed airspace have been developed by the Air Force (AFM 86-8) and the Federal Aviation Administration (FAR Vol XI), as shown in Figure 3-2 and discussed below.





ELEVATION AT RIGHT ANGLES TO RUNWAY

APPROXIMATE SCALE
1:250,000

VERTICAL EXAGGERATION: 10 X

UNOBSTRUCTED AIRSPACE
10,000' PRIMARY INSTRUMENT RUNWAY

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - BMO

FIGURE
3-2

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For both approach and departure, the unobstructed airspace begins 200 feet from the end of the paved runway. It rises at a slope of 50:1 for a horizontal distance of 25,000 feet, at which point it is 500 feet above the runway. This unobstructed airspace continues at 500 feet above the runway for another 25,000 feet. At the same time, the approach/departure corridor widens to 16,000 feet at the ends. The total length of the approach and departure airspace is 20.9 miles.

The airspace on either side of the runway should also be unobstructed. Beginning at the edge of the runway, the unobstructed airspace rises at a slope of 7:1 for a horizontal distance of 1050 feet, at which point it is 150 feet above the runway. This elevation is maintained for another 5450 feet outward from the runway. At this point the slope again rises at a ratio of 20:1 so that over the next 7000 feet, an elevation of 500 feet above the runway surface is reached. This 500-foot elevation is maintained for an additional 30,000 feet outward from the runway. This condition must exist completely around the runway except where the approach/departure airspace takes precedence. No object (topographic or manmade) within 44,500 feet of the runway should be higher than 500 feet. The total width of the regional unobstructed air space is approximately 17 miles.

The existing flying conditions in an area should also be evaluated. The impact on flight corridors, other airfields, and areas of military operation (MOAs) or restricted use should be determined.

The Federal Aviation Administration (FAA) is the responsible federal agency on this subject. All permit applications and follow-on studies (i.e., weather, wind, flight patterns, etc.) must go through the FAA, which in turn releases the results of this review as recommendations. The jurisdiction for permitting, airfield construction, and maintaining unobstructed air space lies with the local government for each community.

3.3 TRANSPORTATION REQUIREMENTS

An operational base site must have the ability to be connected to a major highway and a major railroad, while still being accessible through the designated transportation network (DTN) to the designated deployment area (DDA). The highway and a rail spur will connect the OB with the DAA. Transportation from the DAA to the DDA and the OBTS will be along the DTN.

4.0 GEOGRAPHIC AND CULTURAL CONDITIONS

4.1 LOCATION

Coyote Spring Valley is situated 34 miles from Nellis Air Force Base, Nevada (Figure 1-1). The valley trends north/south, is 40 miles long, and is 8 miles wide at its widest point (Drawing 4-1). It is bounded on the east by the southern Meadow Valley Mountains and the northern Arrow Canyon Range; on the west it is bounded by the Desert National Wildlife Range. U.S. Highway 93 runs the full length of the valley. Traversing west to east across the southern third of the valley is Nevada State Highway 7, which runs from U.S. Highway 93, through the Meadow Valley Mountains, to Moapa, Nevada near Interstate 15 (a distance of 20 miles). Coyote Spring Valley is in two counties; the northern section is in Lincoln County while the southern 20 miles is in Clark County.

Kane Springs Valley lies 64 miles from Nellis Air Force Base. The valley trends northeast/southwest from the north-eastern edge of Coyote Spring Valley. It is 25 miles long, 4 miles wide at the widest point, and lies between the Delamar Mountains on the north and the Meadow Valley Mountains on the south. There is an unpaved road running the length of the valley from U.S. Highway 93 to Elgin which is located on the Union Pacific Railroad service road. The entire valley is within Lincoln County.

4.2 LAND STATUS

Coyote Spring Valley and Kane Springs Valley are generally public lands administered by the Bureau of Land Management (BLM) from their Las Vegas District Office. An exception to this is 1720 acres (2.7 square miles) of private property in the northwestern corner of Coyote Spring Valley (Drawing 4.1). Also, within Coyote Spring Valley there exist 1630 acres (2.6 square miles) of material sites. These are usually state or county borrow pits used for highway construction.

There are three possible changes to the present land status which are awaiting future action. The first is a National Wildlife Range withdrawal application filed in 1974. This application would combine the elongated parcel between the Desert National Wildlife Range (DNWR) (on the west) and U.S. Highway 93 (on the east) with existing potential wilderness land within the DNWR to form a large wilderness area. The application, as filed by the U.S. Fish and Wildlife Service, has had the effect of segregating the area so as to maintain its wilderness characteristics until such time as Congress acts on the application.

The second activity that has a potential for changing the present land status is an ongoing BLM Wilderness Inventory Study. This study is intended to examine areas which may have wilderness characteristics. During the BLM's initial wilderness inventory, several areas were identified for follow-on studies. Areas that will be field-checked during the next phase follow.

1) Delamar Mountains - North Coyote Spring/Southern Kane Springs;

2) Central Delamar Mountains - Northern Kane Springs;

3) Meadow Valley Range - Southern Kane Springs/Eastern Coyote Spring;

4) Arrow Canyon Range - Eastern Coyote Spring; and

5) Fish and Wildlife Areas #1, #2, and #3 - Western Coyote Spring.

The last area above is the aforementioned strip of land west of Highway 93.

The third possible change in land status might result from a Desert Land Entry application (DLE) for 640 acres (1 square mile) in Pahranagat Wash, just north of State Highway 7. Depending on the application's acceptance, this area could become private property.

Other than those private properties already mentioned, the closest private lands to the valleys of study are those near Moapa on the Muddy River (Pahranagat Wash).

5.0 GEOTECHNICAL CONDITIONS

5.1 TERRAIN

The terrain in Coyote Spring Valley is dominated by Pahranagat Wash, which is the north-south trending axial stream through the valley (Drawing 5-1). The stream is incised into Tertiary-aged, caliche-cemented alluvium and is bounded by a highly dissected stream escarpment on either side of the modern floodplain. The alluvial fan surface above the stream escarpment is gently sloping, with rolling topography perpendicular to drainage. The average drainages generally have a depth less than 10 feet, however the drainage density is high. Exceptions to this generally suitable terrain occur in the northeastern portion of the valley (where the tributary Kane Springs Wash enters). Here the topography is very rugged and highly dissected, with incision depths in excess of 10 feet. Tributaries entering from the southeast are not as deeply incised, being less than 10 feet in depth.

In Kane Springs Valley, the terrain north of the axial drainage (Kane Springs Wash) consists of very young alluvial fan deposits. The fan surfaces are moderately sloping and generally dissected less than 10 feet. South of Kane Springs Wash the alluvial fans have undergone recent uplift and dissection, giving rise to more rugged terrain with incision depths in excess of 10 feet. As noted above, where Kane Springs Valley narrows and ends to the southwest, and where Kane Springs Wash joins with Pahranagat Wash, the terrain becomes extremely

dissected with many deep, relatively broad and closely spaced drainages.

5.2 FAULTING

No faults cutting the basin fill in Coyote Spring Valley are shown on the published geologic maps. However, on the aerial photographs there are several lineations of possible faulting origin. Across the fan surface southwest of Pahranagat Wash, there are lineations which are subparallel to the modern stream escarpment. These lineations show no obvious offsets from the air, and may be alluvial in origin. Along the western margin of the valley near Meadow Valley Mountains, a possible escarpment crosses an alluvial fan near its apex. Finally, to the south where the valley narrows, a lineation can be traced east-to-west across the valley from rock-line to rock-line (Drawing 5-1). It crosses all but the most active drainages, and presents a slight escarpment. Although not marked as such on the published geologic maps, where the lineament can be traced into the rocks, it appears to be a fault.

In contrast to Coyote Spring Valley, Kane Springs Valley is obviously fault-bounded. A major northeast-southwest trending fault is located between the southwestern margin of the valley and the adjacent mountains. Toward the southern end of the valley, this fault splays outward from the mountain front, offsetting Quaternary-aged alluvial fans. Aerial photos reveal several scarps parallel to the fault, further suggesting recent movement.

Most Quaternary faults in this region trend north or slightly northeast. The northeast-southwest-trending fault in Kane Springs Valley is not typical of basin and range tectonics, but more closely parallels the Pahranagat shear zone, a northeast-southwest trending zone of left lateral movement. Geologic evidence indicates that movement along the Kane Springs fault is more lateral than the characteristic vertical basin and range movement.

5.3 FLOODING POTENTIAL

In Coyote Spring Valley, major flooding would probably be confined within the incised floodplains of Pahranagat Wash and its tributaries. On the fan surfaces to the south and southwest of the axis of the valley, and midway to the mountain front, sheet flooding is to be expected because drainages are ill-defined, shallow, and shifting. Standing or ponding water occurs in the flats of the southern part of the valley.

In Kane Springs Valley, the potential for flash flooding north of Kane Springs Wash and on active alluvial fans to the south is high due to numerous ill-defined, shallow drainages. Major floods would probably be contained in Kane Springs Wash and in those tributaries to the south which are deeply incised into older fan surfaces.

6.0 GROUND-WATER CONDITIONS

6.1 WATER AVAILABILITY

6.1.1 Perennial Yield

The combined perennial yield of ground water in Coyote Spring and Kane Springs valleys is estimated to be on the order of 2600 acre-feet (Eakin, 1964), which is equivalent to the estimated average annual recharge derived from precipitation within the area. The State Engineer's Office estimated (in 1971) a perennial yield of 18,000 acre-feet for Coyote Spring Valley, with less than 500 acre-feet for Kane Springs Valley. The substantial difference between the perennial yield estimates by Eakin (1964) and the State Engineer's office is probably due to a reevaluation of recharge through precipitation and consideration of inter-basin underflow of ground water in the Coyote Spring hydrologic basin.

6.1.2 Present Water Use

Coyote Spring and Kane Springs valleys are used principally for livestock range and present development of ground water in the area is concentrated in the Muddy River Springs area in the southeastern part of Coyote Spring Valley. Development of ground water in the valley fill in the Muddy River Springs area includes about 12 wells for irrigation and several others for domestic and stock use. The annual withdrawal by wells is estimated to be in the range of 2000 to 3000 acre-feet.

6.2 WATER QUALITY LIMITATIONS

The chemical quality of the ground water in parts of the valley fill apparently is poorer than that of the water discharged from the springs. Few data are available concerning ground-water quality in the Coyote Spring and Kane Springs valleys (Table 6-1). The chemical quality of the water in most ground-water systems in Nevada varies considerably from place to place (Eakin, 1964). Existing analyses of water from the springs in the Coyote Spring and Kane Springs valleys indicate that the water from the springs has a dissolved-solids content of about 620 milligrams per liter (mg/l) and is high in sodium, calcium, bicarbonate, and sulphate.

The water from the Muddy River Springs is classified as hard. In addition, the reported concentration of 2.4 mg/l fluoride in the water is relatively high and reaches the upper limits for this element concentration recommended by the U.S. Public Health Service (1962). However, in general, the water quality in Coyote Spring and Kane Springs valleys offers no constraints for construction usage, and the quality remains suitable for all ordinary purposes (Eakin, 1964).

6.3 IMPACT OF WITHDRAWAL

The younger valley fill in Coyote Spring and Kane Springs valleys is generally above the main ground-water body and is unsaturated. An exception to this is in the vicinity of Coyote Spring in the northern portion of Coyote Spring Valley. There, the ground water moving in the older valley fill from recharge

GROUND WATER AVAILABILITY (IN ACRE FEET PER YEAR)						
PERENNIAL[1] YEILD	PRESENT USE				SOURCE	
2,600[2] 18,000[3]	2,000–3,000				COYOTE SPRING: 1) ALLUVIUM — PERCHED WATER / VALLEY FILL AQUIFER 2) FRACTURED CARBONATE ROCKS KANE SPRINGS: 1) ALLUVIUM — PERCHED WATER / VALLEY FILL AQUIFER 2) FRACTURED VOLCANIC ROCK	MOD MOD
	IRRIGATION	INDUSTRIAL	MUNICIPAL	DOMESTIC STOCK		PO
	2,000–3,000	—	—	MINOR		

[1] PERENNIAL YIELD IS THE AMOUNT OF GROUND WATER THAT CAN BE WITHDRAWN PER YEAR FROM A BASIN WITHOUT CAUSING UN

[2] NEVADA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES (1964)

[3] NEVADA STATE ENGINEERS ESTIMATE (1971)

ER YEAR)			POTENTIAL IMPACTS			
	QUALITY[2]		GROUND WATER LEVELS	WATER QUALITY	SPRING DISCHARGE	WILDLIFE
G: ED WATER FILL FER TE ROCKS S: ED WATER FILL FER IC ROCK	MODERATE SALINITY, HIGH FLUORIDE, MODERATE TOTAL DISSOLVED SOLIDS		MODERATE TO RAPID DECLINE	INCREASED CONCENTRATION OF TOTAL DISSOLVED SOLIDS, FLUORIDE, AND SALINITY	COYOTE SPRING: PROBABLE EFFECT IF VALLEY FILL IS DEVELOPED KANE SPRINGS: 1) VALLEY FILL AQUIFER: NO EFFECT 2) PERCHED WATER: PROBABLE EFFECT IF DEVELOPMENT IS CLOSE TO SPRINGS	—
	POTABILITY	CONSTRUCTION POTENTIAL				
	FAIR	GOOD				

WITHOUT CAUSING UNDESIRABLE EFFECTS

SUMMARY TABLE OF GROUND WATER CONDITIONS IN COYOTE SPRING KANE SPRINGS VALLEYS

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TABLE 6-1

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areas in the Sheep Range discharges into the younger valley fill beneath the White River channel and produces a semiperched ground-water condition. The water in the perched zone is held above the main ground-water body by sediments of relatively low vertical permeability.

Coyote Spring is used for irrigation, and present variations in flow probably occur in response to variations in precipitation. However, development of the main valley-fill aquifer in the vicinity of Coyote Spring would probably have a direct impact on the perched ground water and affect the spring discharge.

A similar possibility for detrimental effects exists in Kane Springs Valley. Six springs in Kane Springs Valley issue from or adjacent to volcanic rocks. This suggests that these springs are supplied by ground water moving through fractures and that the ground water is partly perched as the result of differential permeability between volcanic rocks. Therefore, any ground-water development in Kane Springs Valley close to some of the existing springs may lower the perched water table significantly and possibly have a direct impact on the spring discharges. Development of the main valley-fill aquifer, if planned properly, is feasible, although costly.

Because of the long-term water requirements of an operational base, a margin of error should be allowed for the existing estimate of perennial yield in Coyote Spring and Kane Springs valleys to avoid ground-water withdrawals in excess of what may actually be available. The withdrawal of 13,000 acre-feet per

year of ground water for an operating base would approach the amount of ground water available in the valley-fill aquifers in Coyote Spring and Kane Springs valleys. Withdrawal of significantly less than 13,000 acre-feet per year would greatly reduce the potential for detrimental effects to the ground-water system.

In addition, it should be noted that significant ground-water development in Coyote Spring and Kane Springs valleys is likely to meet stiff opposition from water users of Moapa Springs. Moapa Springs is believed to receive its water from the north by underflow through carbonate rocks from Coyote Spring and Kane Springs valleys, and its water is entirely allocated for use by a power plant and other water users.

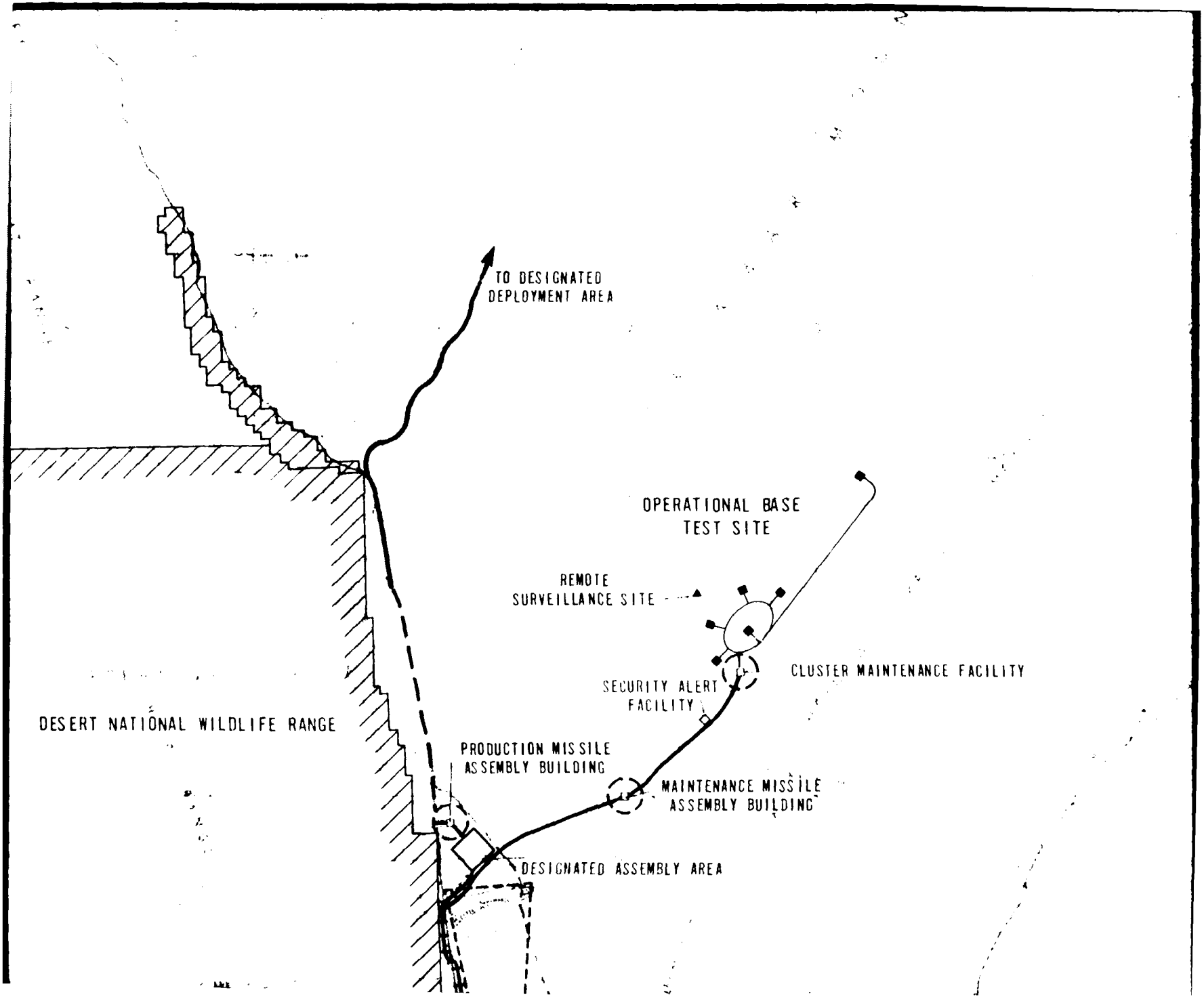
7.0 OPERATIONAL BASE LAYOUT OPTIONS

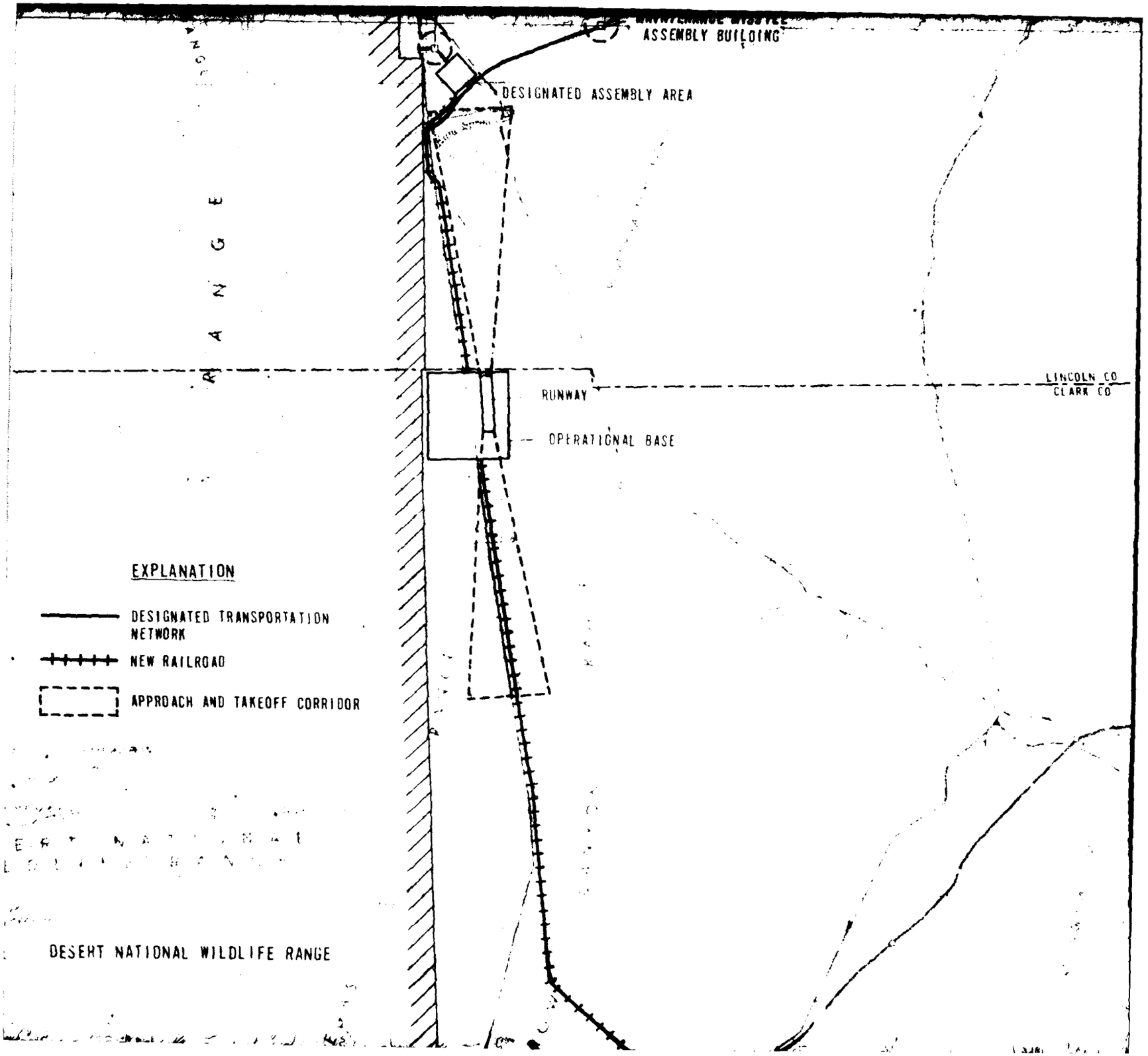
7.1 FACTORS GOVERNING THE OPERATIONAL BASE SITE SELECTION

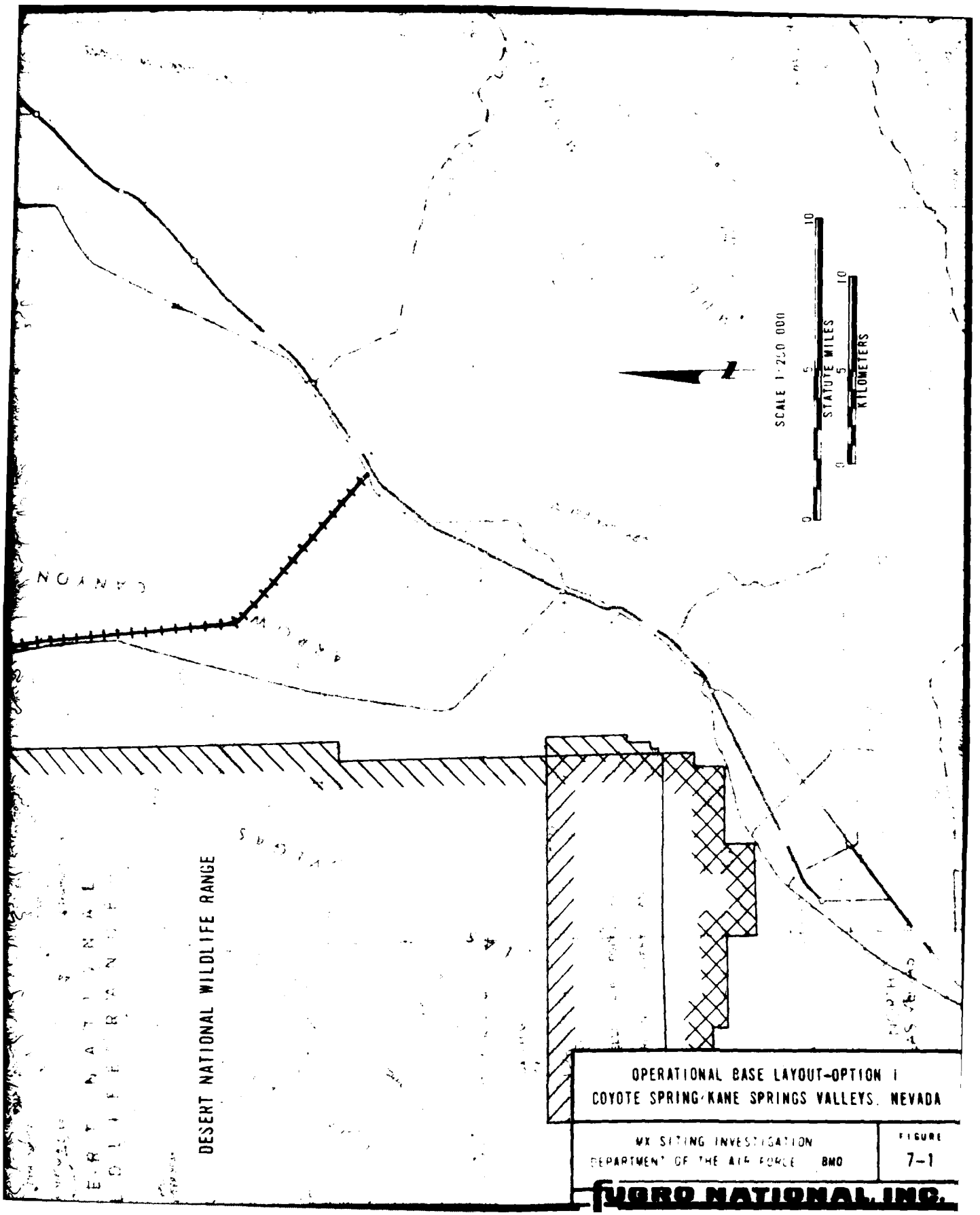
Four possible OB configurations were developed in the Coyote Spring Valley/Kane Springs Valley operational base area. These configurations (as shown in Figures 7-1 to 7-4) are based on the data presented in the previous sections of this report. Because of site conditions discussed below, the location of the OB proper is relatively inflexible. Hence the same OB location was used for each configuration. Transportation and access conditions and distances between components are specific to each configuration.

Operational Base Layout - Option 1 (Figure 7-1, Drawing 7-1) was developed around the OB location. The OB location is controlled by the availability of a 5500-acre area and by the unobstructed approach and departure airspace needed for the airfield. Of these two conditions, the unobstructed airspace is the more difficult to meet. There is no area of 17 miles by 20.9 miles of unobstructed airspace in either Coyote Spring Valley or Kane Springs Valley, and there is only a limited area where the approach/departure criteria can be met. This area is in Coyote Spring Valley and trends north/south. Assuming the prevailing wind is also north/south, this should be an acceptable area. However, there is the possibility, with the two valleys converging at the north, of crosswinds.

The area of acceptable airfield location is north of the junction of State Highway 7 with U.S. Highway 93 and ends


TO DESIGNATED
DEPLOYMENT AREA
OPERATIONAL BASE
TEST SITE
REMOTE
SURVEILLANCE SITE
CLUSTER MAINTENANCE FACILITY
SECURITY ALERT
FACILITY
DESERT NATIONAL WILDLIFE RANGE
PRODUCTION MISSILE
ASSEMBLY BUILDING
MAINTENANCE MISSILE
ASSEMBLY BUILDING
DESIGNATED ASSEMBLY AREA


ASSEMBLY BUILDING
DESIGNATED ASSEMBLY AREA
RANGE
RUNWAY
OPERATIONAL BASE
LINCOLN CO
CLARK CO
EXPLANATION
DESIGNATED TRANSPORTATION NETWORK
NEW RAILROAD
APPROACH AND TAKEOFF CORRIDOR
DESERT NATIONAL WILDLIFE RANGE



OPERATIONAL BASE LAYOUT-OPTION I
COYOTE SPRING-KANE SPRINGS VALLEYS, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE BMO

FIGURE
7-1

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approximately 6 miles north of the same junction. The western limit of the area is bounded by the Desert National Wildlife Range (DNWR) and the eastern edge is bounded by an area of poor terrain on the western bank of Pahranagat Wash. This area is large enough for a 5500 acre OB.

To further aid in selecting a final 5500 acre site, the area is traversed on the northern end by the Clark/Lincoln county line. If one assumes the OB should be totally in one county, then south of the county line (Clark County) is the only location of sufficient size. Because of the constraints imposed by the natural and cultural conditions, this OB site will be constant for all four of the options presented. The OB would then be 30 miles from the nearest portion of the DDA.

Looking at a map of this selected site, two possible problems appear. One is that U.S. Highway 93 runs north/south through the site. Parallel to the road is a 69 kilovolt powerline that is also the proposed route of the southern California-bound Intermountain Power Project (IPP) transmission lines. There are a number of options as to whether the OB is split by a highway, railroad, and transmission lines or whether these are re-routed around the base to the west. Also, if rerouting is required, there are questions of whether to maximize the use of the existing highway or minimize the road length by building straight roads around the western edge of the base. The base at this location would be approximately 31.5 miles from I-15 and

25.5 miles from the Union Pacific Railroad depending on the route selected.

The second possible problem is that the area west of U.S. Highway 93 has been under application to be withdrawn into the neighboring DNWR as a wilderness area since 1974. Until Congress acts on this application, no other application for withdrawal can be acted upon.

7.2 AIRSPACE CONSIDERATIONS

Having selected an airfield location within the OB based on the criteria presented in Section 3.2, it is necessary to more carefully examine the airspace and flying conditions in the area. The elevation of the airfield at the proposed OB would be approximately 2380 feet above sea level (ASL). All topography within the unobstructed approach and departure airspace is within the criteria as given. The topography at right angles to the airfield, however, does not meet the criteria of being less than 2880 feet ASL (i.e., less than 500 feet above runway elevation). Within the area that should be unobstructed, there are the Sheep Range, Elbow Range, Las Vegas Range, Arrow Canyon Range, and the Meadow Valley Mountains. A brief description of these north-south trending ranges is given in the following paragraphs. The Delamar Mountains, north of the runway, are outside of this area.

The Sheep Range is 7.5 miles to the west of the airfield. The mountain peaks there range from 4710 to 6228 feet ASL. The peak which is 6228 feet is the highest within the area

of discussion. The height above the elevation limit is 3348 feet (the elevation limit is 500 feet above the runway elevation).

The Elbow Range is 3 miles west of the airfield. The highest peak there is 4168 feet. Two of the lowest peaks in the area are 3172 feet and 3306 feet high. They are also closest to the runway, only 3 miles and 2.5 miles, respectively. The elevation above the height limit is 912 feet.

Las Vegas Range is 7.5 miles southwest of the airfield. The highest peak in the area is 4124 feet, which is 1244 feet above the height limit.

The Arrow Canyon Range begins 3.5 miles southeast of the airfield. The highest mountain in the area is 4634 feet. The range of mountain peaks is from 3282 feet to 4634 feet. The elevation above the height limit is 1075 feet.

Meadow Valley Mountains are approximately 4 miles east of the airfield. There the highest peaks range from 3850 feet to 4757 feet. The height above the elevation limit is 1877 feet.

The present flying conditions are such that the airfield and required airspace lies totally within the Desert Military Operation Area (MOA). This MOA is situated north and east of the Nellis Air Force Range and is used for pilot training exercises. The MOA is not restricted airspace, but requires prior coordination with Nellis Range Control for civilian and other users. Nellis pilots use the airspace from 100 feet above

ground level up to but not including 1800 feet during daylight hours, Monday through Friday. Another potential airspace conflict could exist in regard to the operating a' space north of Nellis Air Force Base proper and Henderson Airport in Las Vegas.

7.3 RAILROAD CONSIDERATIONS

With the Operational Base location selected, the problem of providing transportation to the site needs to be considered. The site is located on a federal highway which provides vehicle access. The airfield for air traffic has been discussed. The remaining form of transportation which needs to be considered is the railroad. From the selected site, four possible railroad routes exist. These four routes join the Union Pacific Railroad at Elgin, Moapa, 2 miles north of Dry Lake, and at the U.S. Highway 93 and Interstate 15 Junction, respectively (Drawing 7-1).

The Elgin Route begins 43 miles from the OB and represents the greatest length of track that would have to be laid. It also represents the most direct route to Salt Lake City but at the same time it lengthens the trip to Las Vegas. The route from Elgin southwest through Kane Springs Valley to the OB would start by traversing a pass 3 miles long, 1000 feet wide, and having a six percent average slope. Some slopes are ten to 20 percent. The rail would pass within less than a mile of the OBTS. It would parallel and/or crisscross the Kane Springs Wash as well as cross the Pahranagat Wash at some point.

The Moapa Route starts 20 miles from the OB and would parallel State Highway 7. It is the second best case in terms of rail distance to Las Vegas and Salt Lake City and would be the least amount of track to lay. The route would cross approximately 5 miles of private property. Also, 7 miles would be over mountainous terrain consisting mostly of carbonate rocks. This would mean having many cuts and fills. The Pahranagat Wash would have to be crossed as well.

The Dry Lake Route originates 25.5 miles from the OB. This route has the least extra miles to travel overall. It also represents the second least amount of track to lay. This route would have to go through one pass; the pass is 1000 feet wide and 3700 feet long. Half of this length is at a grade of 32 percent. Thus, it would require a large cut and fill to produce an acceptable railroad grade. Once through this pass, the route would parallel U.S. Highway 93.

The U.S. Highway 93/Interstate 15 Junction Route begins 31.5 miles from the OB and parallels U.S. 93 for its entire length. It is the shortest route to Las Vegas but adds considerable mileage to the Salt Lake City route. This is the second worst case in terms of extra miles to travel. The Union Pacific track is east of Interstate 15 at the point of juncture. This necessitates an over- or underpass. The only other item of concern is that the route would have to cross a playa for 4 miles in Hidden Valley.

The Dry Lake Route was selected as the preferred route to be shown on the layout options. It is the second shortest in amount of track to be laid. Also, it is the best case in terms of distances to Las Vegas and Salt Lake City. This route does not need to cross Interstate 15 to reach the Union Pacific line. There is no playa, rough terrain, or private property with which to contend. The route does not come close to the OBTS or the DTN to cause conflict with OB activities or Strategic Arms Limitation Treaty verification. The only negative factor is the one short pass which must be negotiated.

7.4 DESIGNATED TRANSPORTATION NETWORK CONSIDERATIONS

Having selected the OB location along U.S. Highway 93, the use of that route for the DTN seems logical. To follow U.S. 93 to its first entry point into the DDA in Pahrce Valley would mean traveling approximately 56 miles. The closest portion of the DDA to the OB is in Delamar Valley which would mean traveling only 30 miles.

To accomplish this shorter route, a road would have to be built across a portion of the western side of the Delamar Mountains. At the point of crossing, there is a pass-like area which is 7 miles in length with an average slope of four to five percent. There are two narrow points in the pass; they are 300 to 400 feet wide. The southern one is about 1 mile long with three to four percent slope; the northern narrow point is only 1000 feet in length with about four percent slope. At the northern end of the crossing, entering Delamar Valley, there is

a 1000-foot wide pass which has a ten percent slope for a distance of 2000 feet.

The DTN, as presented in the layouts, will enter the DDA in Delamar Valley. By doing this, the time to the DDA is shortened. The main traffic flow of special transportion vehicles, and other MX system-related travel, will not have an opportunity to impact the Pahranagat National Wildlife Refuge and those population centers which exist along U.S. 93 before it reaches Pahroc Valley. An obvious negative factor is the construction cost through the mountains.

7.5 OPERATIONAL BASE LAYOUT - OPTION 1

Assuming that the OB site is located as described above, the next activity area to be located is the DAA (Figure 7-1, Drawing 7-1). Option 1 places the DAA 10 miles north of the OB along U.S. Highway 93 (Table 7-1). This placement minimizes the distance from the DAA to the OBTS, while still using the easy access of U.S. Highway 93. Near the DAA, but not within the 2965-foot standoff distance is the Production MAB. North of the Production MAB along U.S. Highway 93, the DTN runs 7 miles through the Delamar Mountains into Delamar Valley. The route through the mountains assumes that the shortest distance to the DDA is desired and that using existing highways is not desirable.

The Maintenance MAB is 5 miles to the northeast of the DAA in Kane Springs Valley. It is 5 miles from the Maintenance MAB to

Option (4)	RAILROAD		HIGHWAY		DESIGNATED TRANSPORT	
	From Union Pacific to OB (1)	From OB to DAA	From Interstate 15 to OB	From OB to DAA	From DAA to Maintenance MAB	From DAA to Production MAB
1	25.5 (2)	10	31.5	10	5	.56 (3)
2	25.5	2	31.5	2	8	15
3	25.5	10	31.5	10	.56	4
4	25.5	2	31.5	2	.56	10

Note:

(1) See Figure 3-1 for Abbreviations
(2) Distances Given Are in Statute Miles
(3) .56 Mile Represents the 2965-Foot Stand Off Distance in Miles
(4) See Text and Figures 7-1, 7-2, 7-3, and 7-4)

TRANSPORTATION NETWORK (DTN)				DTN/HIGHWAY		Straight Line From Maintenance MAB to Production MAB
Production MAB	From Maintenance MAB to OBTS	From Production MAB to DDA	From OBTS to DDA	From OBTS to OB	From OB to DDA	
.56 (3)	6.5	17	11.5	22	30	5.5
	4	12	11	13	30	7
	10	15	11	20.5	30	5
	5	19	5.5	9	30	8

DISTANCES BETWEEN OPERATIONAL BASE COMPONENTS
COYOTE SPRING/KANE SPRINGS VALLEYS, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - BMO

TABLE 7-1

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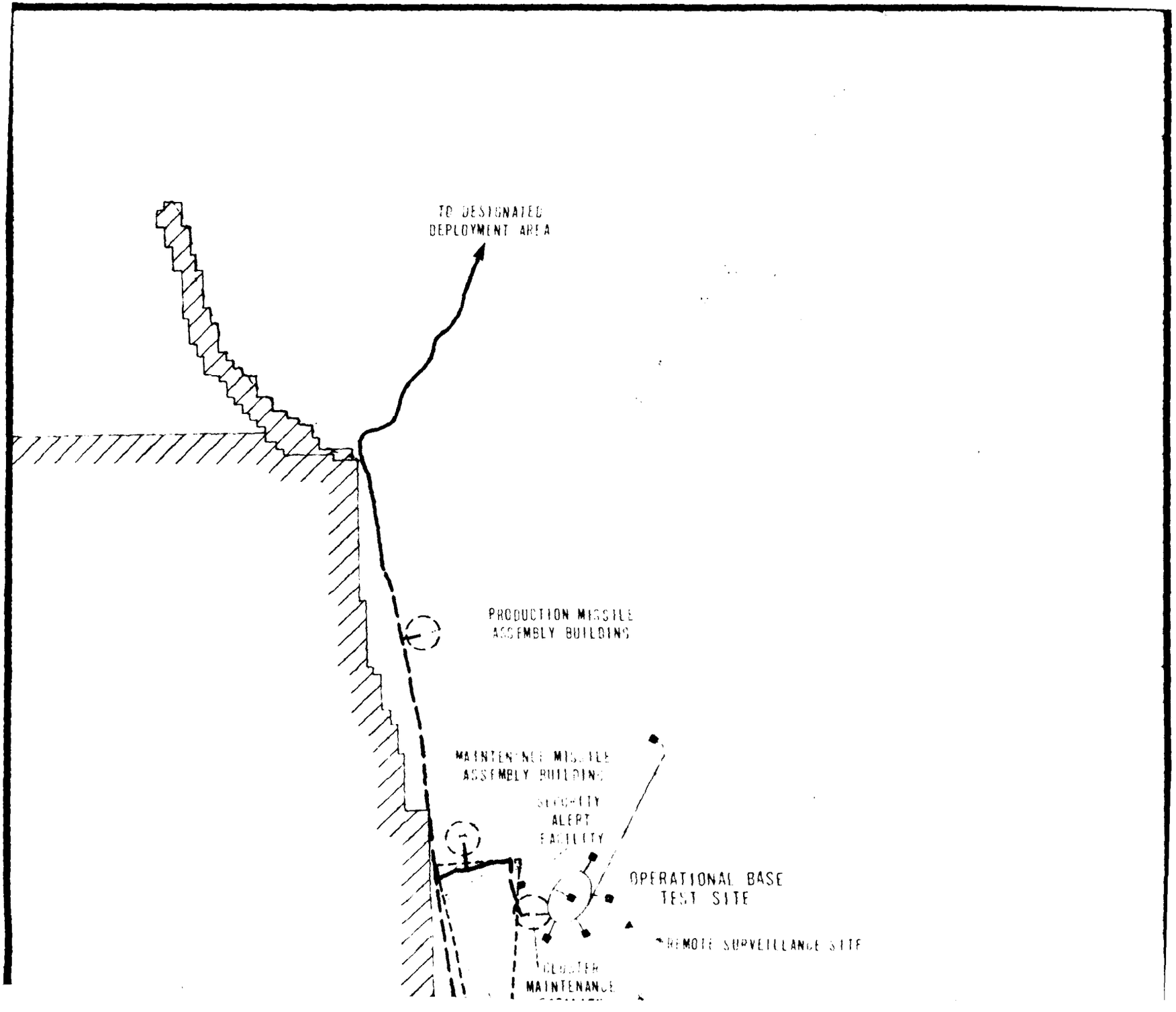
the SAF and 1.5 miles to the CMF at the OBTS. This places the OBTS 22 miles from the OB.

7.6 OPERATIONAL BASE LAYOUT - OPTION 2

The Option 2 (Figure 7-2) is based on the same location for the OB, railroad, and DTN Route to the DDA as Option 1. The difference in this option is that the DAA has been located 2 miles north of the OB to minimize travel distance. From the DAA to the Maintenance MAB is 8 miles. The Maintenance MAB has been located as close to the OBTS as possible. The OBTS has been moved southwest of its Option 1 site to minimize its distance to the OB. The distance between the Maintenance MAB and the OBTS is 4 miles; from the OBTS to the OB is 13 miles. Seven miles north of the Maintenance MAB is the Production MAB. The Production MAB is 12 miles from the DDA.

7.7 OPERATIONAL BASE LAYOUT - OPTION 3

Option 3 (Figure 7-3) uses the same OB location as the previous two options. This option minimizes the distances between the DAA and the OBTS by placing the DAA 10 miles northeast of the OB on the northeastern side of Pahranagat Wash. A direct route would have to be built for the highway and railroad between the OB and the DAA, with a drainage crossing at Paharangat Wash. A little more than 2965 feet away from the DAA to the northeast is the Maintenance MAB. From the Maintenance MAB it is 10 miles to the OBTS. OBTS is then 20.5 miles from the OB, and 4 miles northwest of the DAA is the Production MAB. The DDA is 15 miles further north.


TO DESIGNATED
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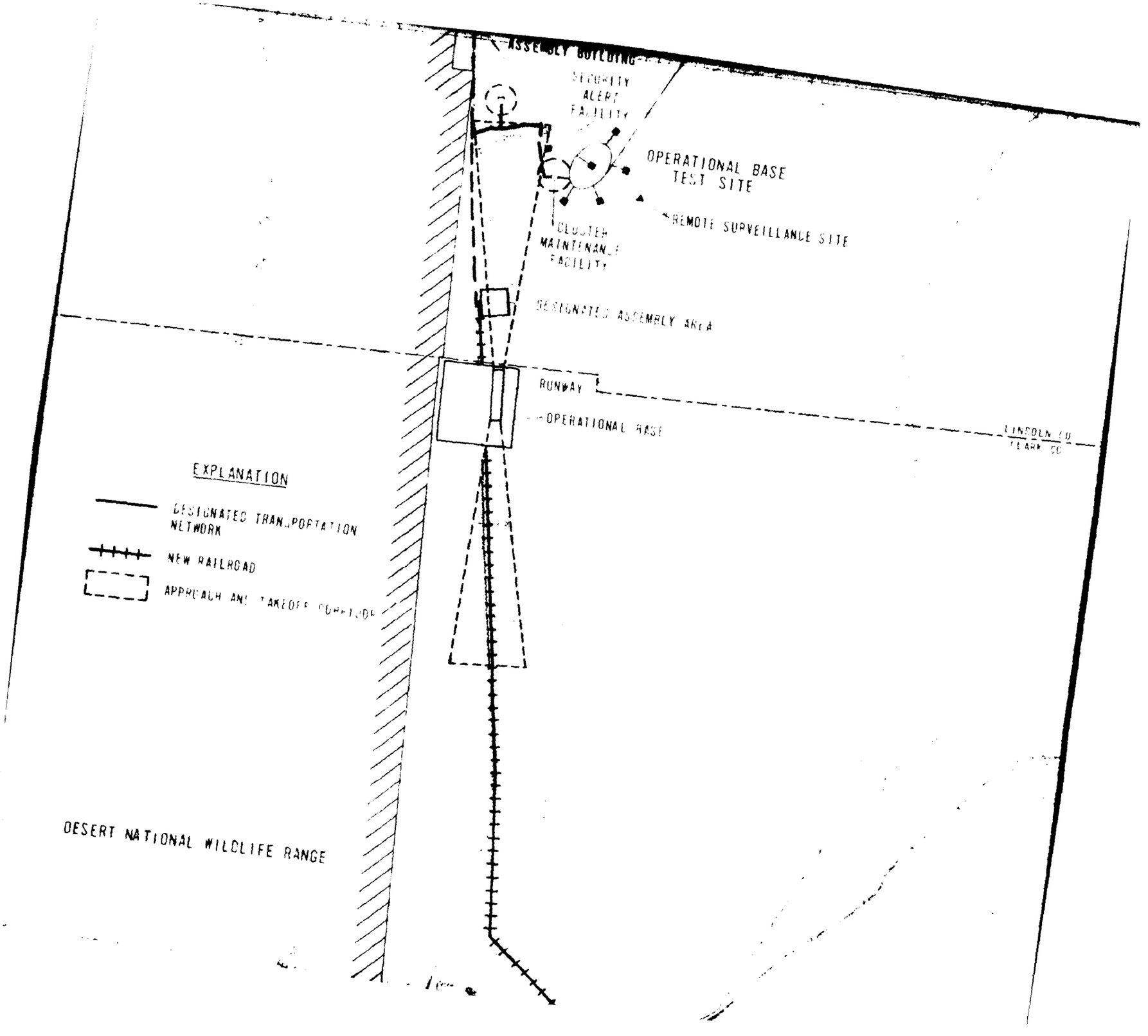
PRODUCTION MISSILE
ASSEMBLY BUILDING
ALERT
FACILITY
OPERATIONAL BASE
TEST SITE
REMOTE SURVEILLANCE SITE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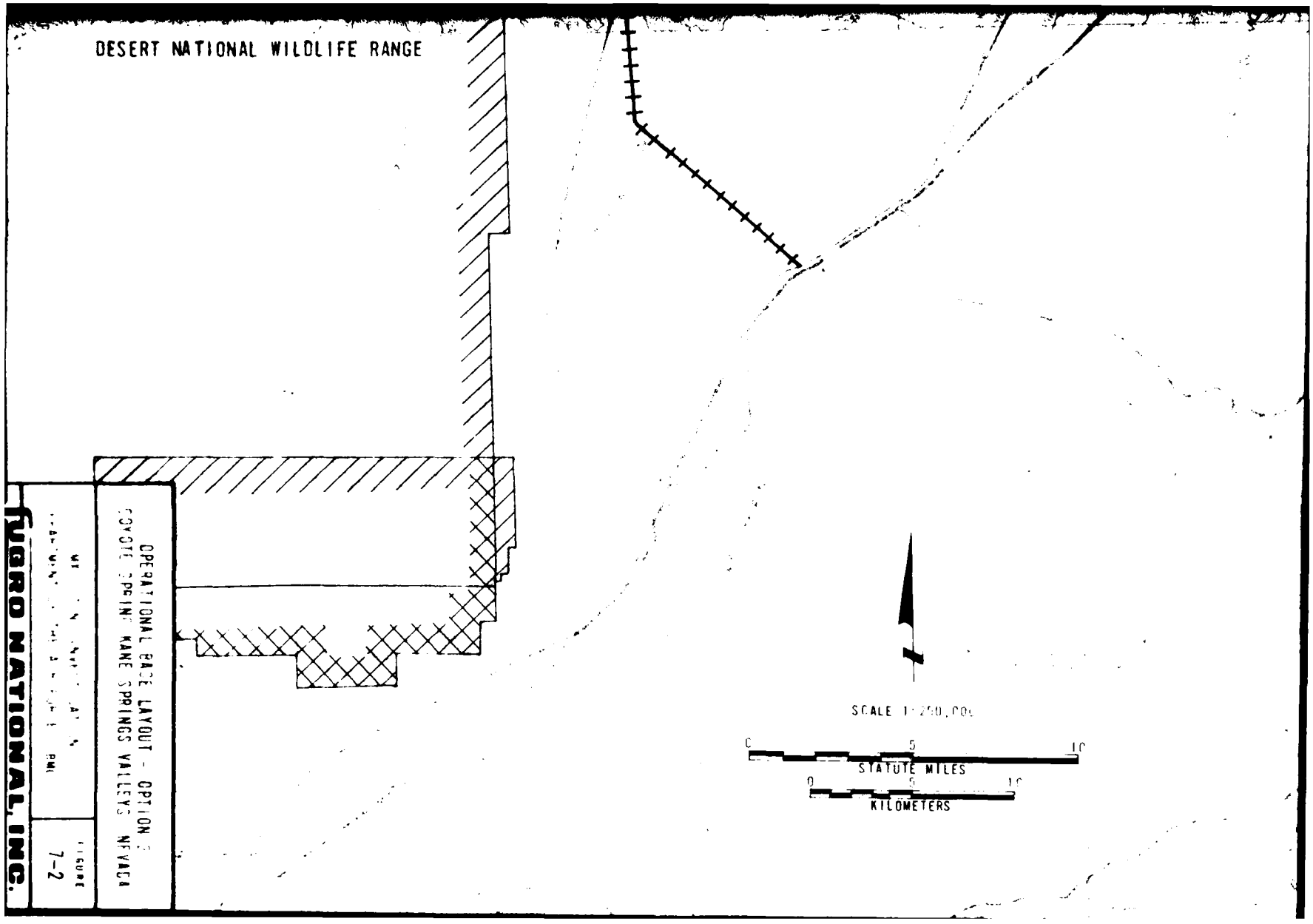
SECURITY ALERT FACILITY
OPERATIONAL BASE TEST SITE
REMOTE SURVEILLANCE SITE
CLUSTER MAINTENANCE FACILITY
DESIGNATED ASSEMBLY AREA
RUNWAY
OPERATIONAL BASE
LINCOLN CO
EXPLANATION
DESIGNATED TRANSPORTATION NETWORK
NEW RAILROAD
APPROACH AND TAKEOFF CORRIDOR
DESERT NATIONAL WILDLIFE RANGE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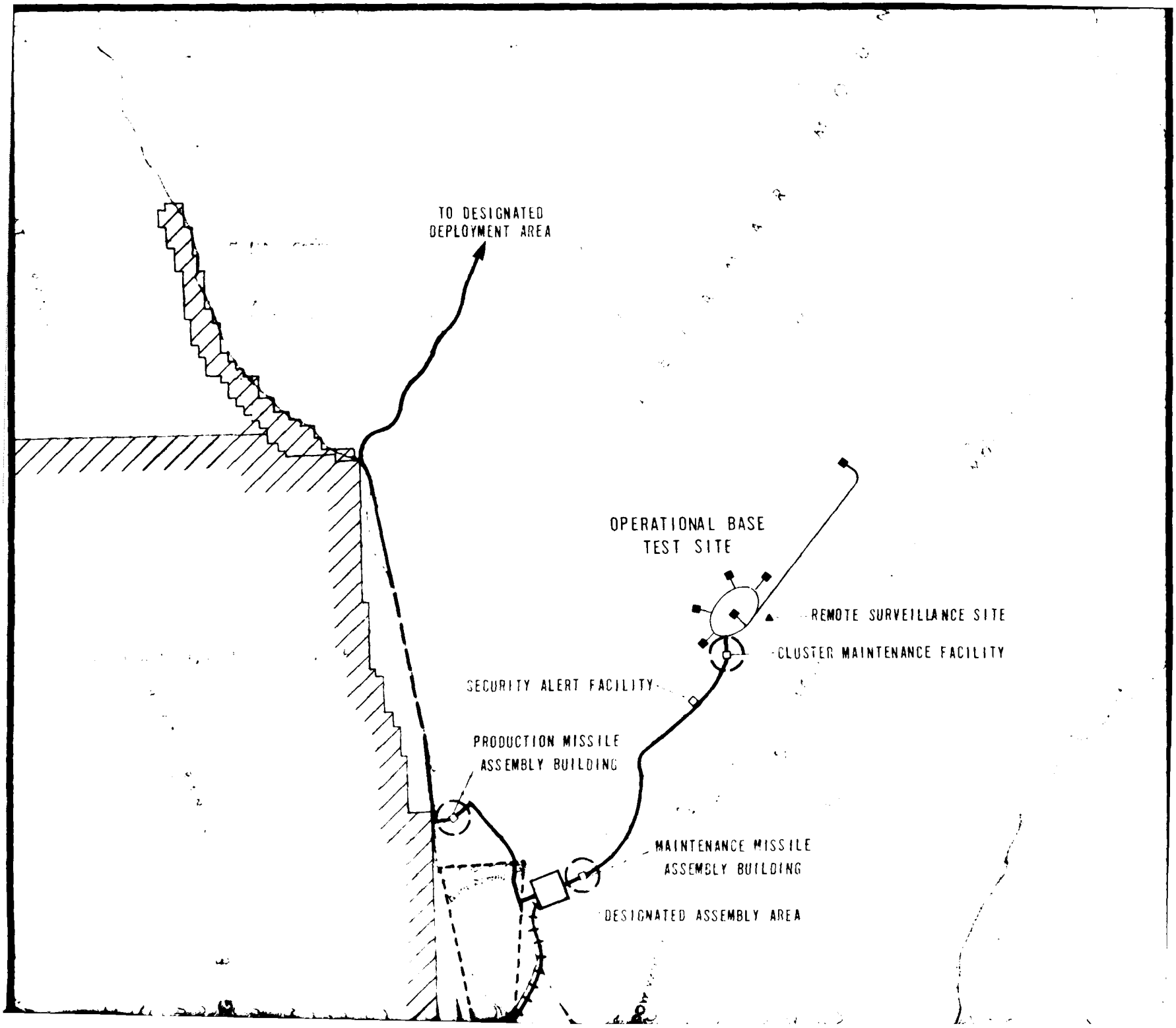
SCALE 1:250,000
0 5 10
STATUTE MILES
0 5 10
KILOMETERS
OPERATIONAL BASE LAYOUT - OPTION 2
COYOTE SPRING KANE SPRINGS VALLEYS NEVADA
FIGURE
7-2
FUGRO NATIONAL, INC.


TO DESIGNATED
DEPLOYMENT AREA
OPERATIONAL BASE
TEST SITE
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CLUSTER MAINTENANCE FACILITY
SECURITY ALERT FACILITY
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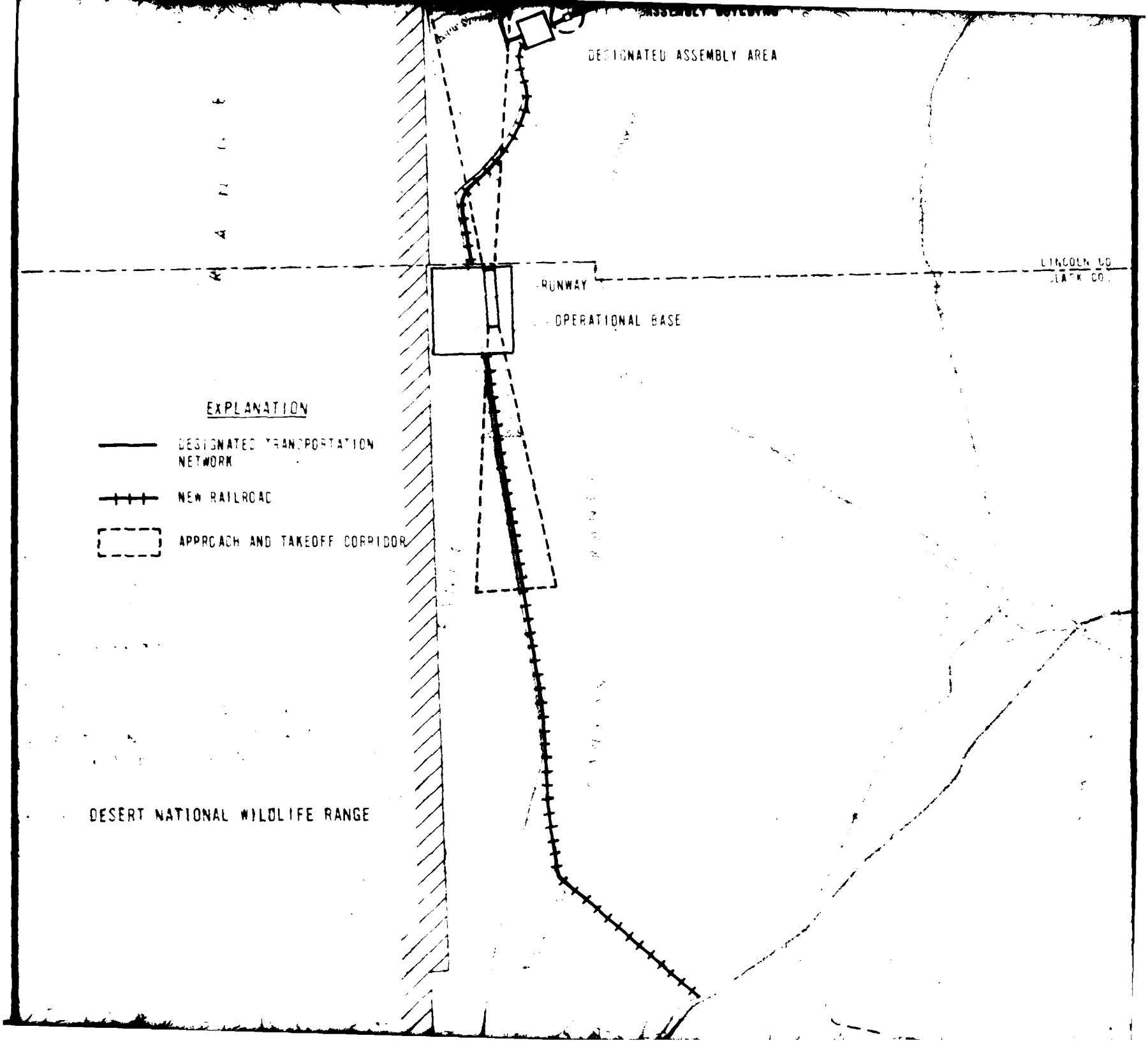
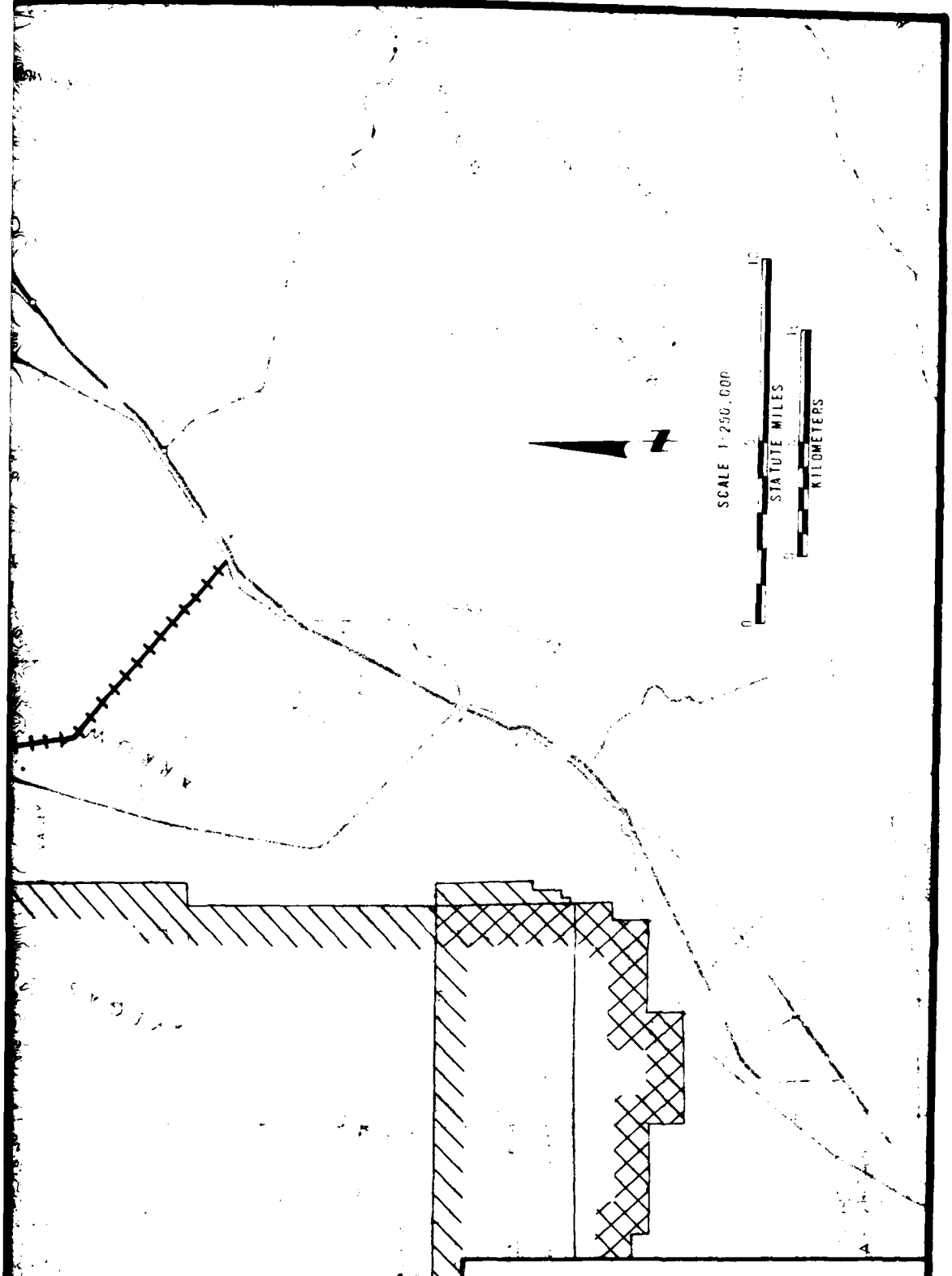
ASSEMBLY BUILDING
MAINTENANCE MISSILE
ASSEMBLY BUILDING
DESIGNATED ASSEMBLY AREA


DESIGNATED ASSEMBLY AREA
RUNWAY
OPERATIONAL BASE
LINCOLN CO
NYE CO
EXPLANATION
DESIGNATED TRANSPORTATION NETWORK
NEW RAILROAD
APPROACH AND TAKEOFF CORRIDOR
DESERT NATIONAL WILDLIFE RANGE



OPERATIONAL BASE LAYOUT - OPTION 3
COYOTE SPRING KANE SPRINGS VALLEYS, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE BMO

FIGURE
7-3

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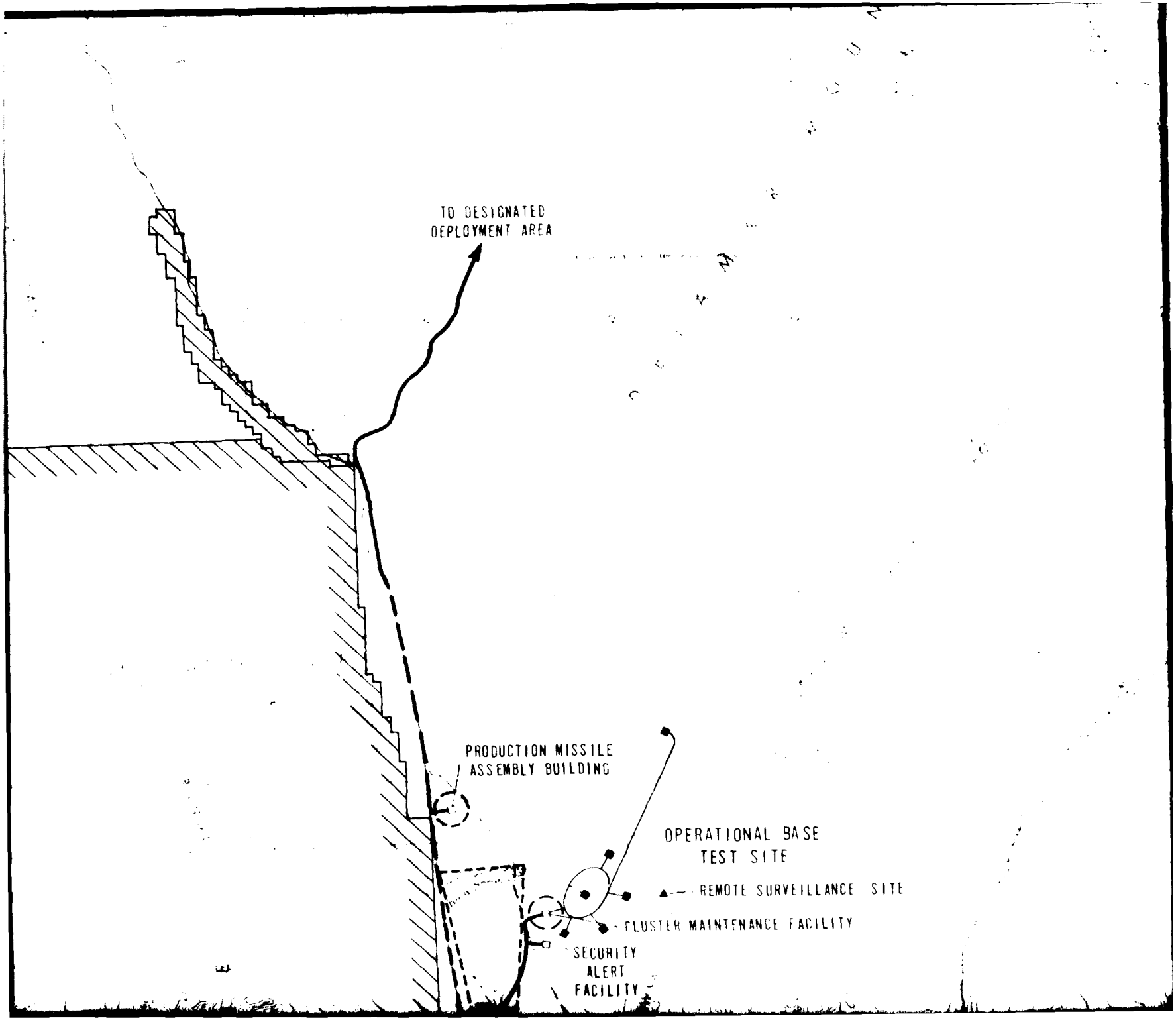
1 B

7.8 OPERATIONAL BASE LAYOUT - OPTION 4

The Option 4 (Figure 7-4) has the same OB location as the other options. This option attempts to minimize the total area and distances between the main activities. The DAA is 2 miles north of the OB, as in Option 2, but unlike Option 2, the Maintenance MAB is a little over 2965 feet to the north of the DAA. From the Maintenance MAB it is only 4 miles northeast across Pahranagat Wash to the OBTS. The OBTS location is the one used in Option 2. The Production MAB is 8 miles north of the Maintenance MAB along U.S. Highway 93. The Production MAB is 19 miles from the DDA in Delamar Valley.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ASSEMBLY BUILDING
OPERATIONAL BASE
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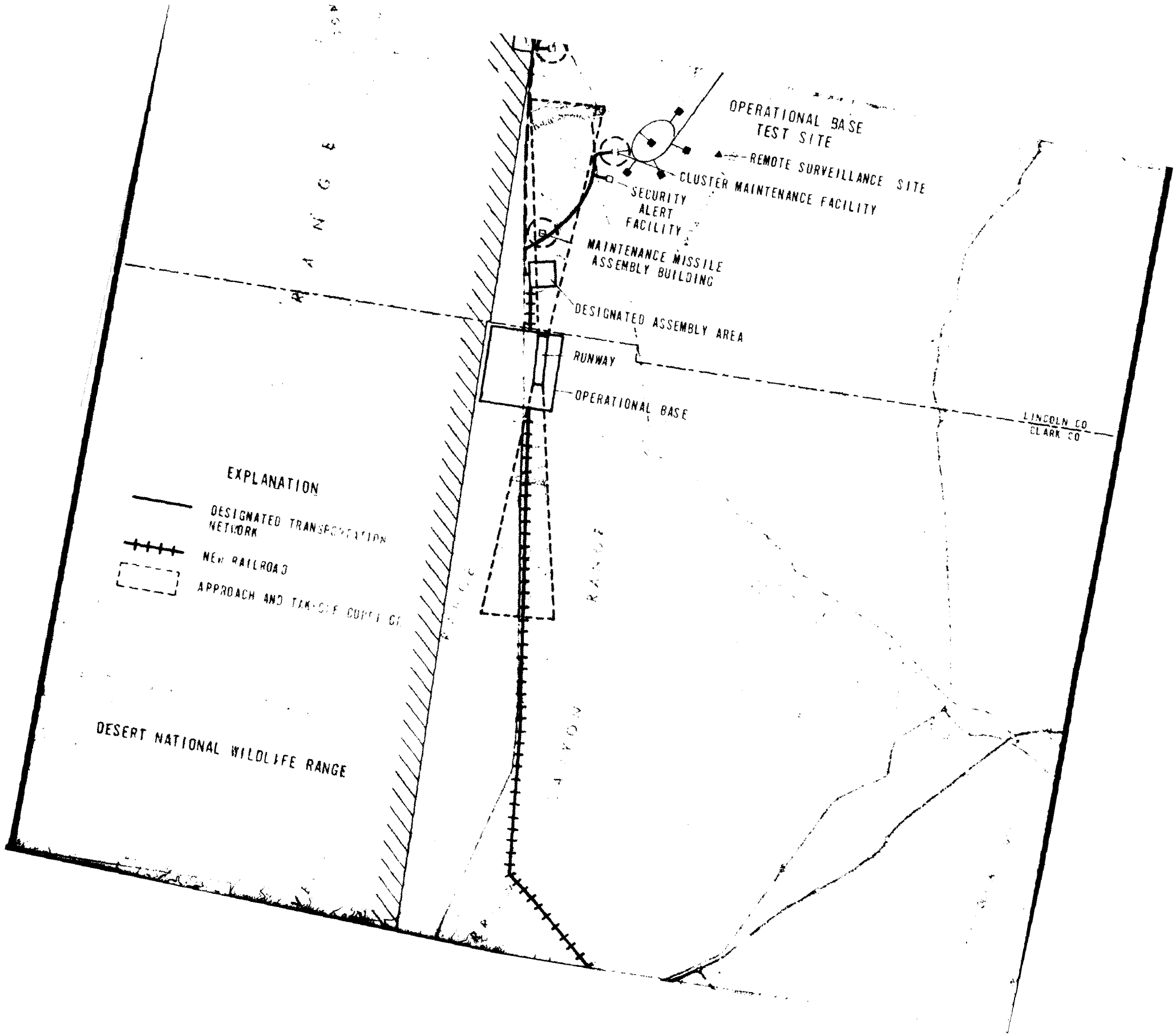
REMOTE SURVEILLANCE SITE
CLUSTER MAINTENANCE FACILITY
SECURITY
ALERT
FACILITY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MAINTENANCE MISSILE
ASSEMBLY BUILDING
DESIGNATED ASSEMBLY AREA
RUNWAY
OPERATIONAL BASE
LINCOLN CO
CLARK CO
EXPLANATION
DESIGNATED TRANSPORTATION NETWORK
NEW RAILROAD
APPROACH AND TAKE-OFF CORRIDOR
DESERT NATIONAL WILDLIFE RANGE

OPERATIONAL BASE LAYOUT - OPTION 4
COYOTE SPRING KANE SPRINGS VALLEYS NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE BMO

FIGURE
7-4

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8.0 CONCLUSIONS

Based on the preceding discussions, it is possible to reach the following preliminary conclusions regarding the suitability of Kane Springs and Coyote Spring valleys for an operational base site:

- In general, Coyote Spring and Kane Springs valleys have sufficient area for the layout of the operational base and its components. There are several areas of adverse terrain and flooding potential within the valleys but these can be avoided or mitigated. Additionally there are active faults, primarily in Kane Springs Valley, but these probably can be accomodated by avoidance and appropriate seismic design.

- Ground water in Coyote Spring and Kane Springs valleys is of suitable quality for use during operational base construction and operation. The quantity of available water needs further evaluation, but appears to be adequate for the needs of the OB. None the less, withdrawal of ground water will need to be carefully planned and may result in reduced spring discharges.

- Further consideration will have to be given to the active faults in Kane Springs Valley and siting criteria that may be applicable for structures located in this valley. Because of terrain conditions in the valleys, it is not possible to site an operational base which fully complies with guidelines for regional unobstructed airspace.

- Although there is sufficient area for the total OB layout, the location of the OB proper is restrained by: 1) the airfield criteria applied in reference to the approach and departure corridor and that corridor's relationship to the predominant winds; 2) avoidance of the area of poor terrain; 3) avoidance of the Desert National Wildlife Range; and 4) locating the total area of the OB in one county (Clark County).

- Because of the restraints noted above, the area for the OB can become too small if the area west of U. S. Highway 93 becomes a wilderness area attached to the Desert National Wildlife Range.

- Although the location of the OB proper is inflexible, there appear to be a variety of locations available for the other activity areas. Four possible configurations have been

presented here; final configurations would need to be based on transportation tradeoffs and compatibility of the various activity areas with airfield approach and takeoff corridors. Similarly, construction of a rail spur, rerouting of existing roads, and access to the DDA will require tradeoffs in construction difficulty.

METRIC CONVERSIONS

Because of the large number of distance figures presented in this report, it was felt that presentation of metric equivalents within the text would result in cumbersome reading. Therefore, the metric conversions are presented below for convenience.

1 foot = 0.3048 meters
1 mile = 1.6093 kilometers
1 acre = 0.4047 hectares
1 mile^2 = 259 hectares or 2.59 km^2
1 acre foot = 1230 meters^3

LIST OF ABBREVIATIONS

AFM	Air Force Manual
ASL	Above Sea Level
BLM	Bureau of Land Management
BMO	Ballistics Missile Office
CMF	Cluster Maintenance Facility
DAA	Designated Assembly Area
DDA	Designated Deployment Area
DLE	Desert Land Entry
DNWR	Desert National Wildlife Range
DTN	Designated Transportation Network
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
IPP	Intermountain Power Project
MAB	Missile Assembly Building
MOA	Military Operation Area
OB	Operational Base
OBTS	Operational Base Test Site
RSS	Remote Surveillance Site
SAF	Security Alert Facility

BIBLIOGRAPHY

Division of Water Resources, 1979, State of Nevada Water Resources and Interbasin Flow (map): Nevada State Engineers Office.

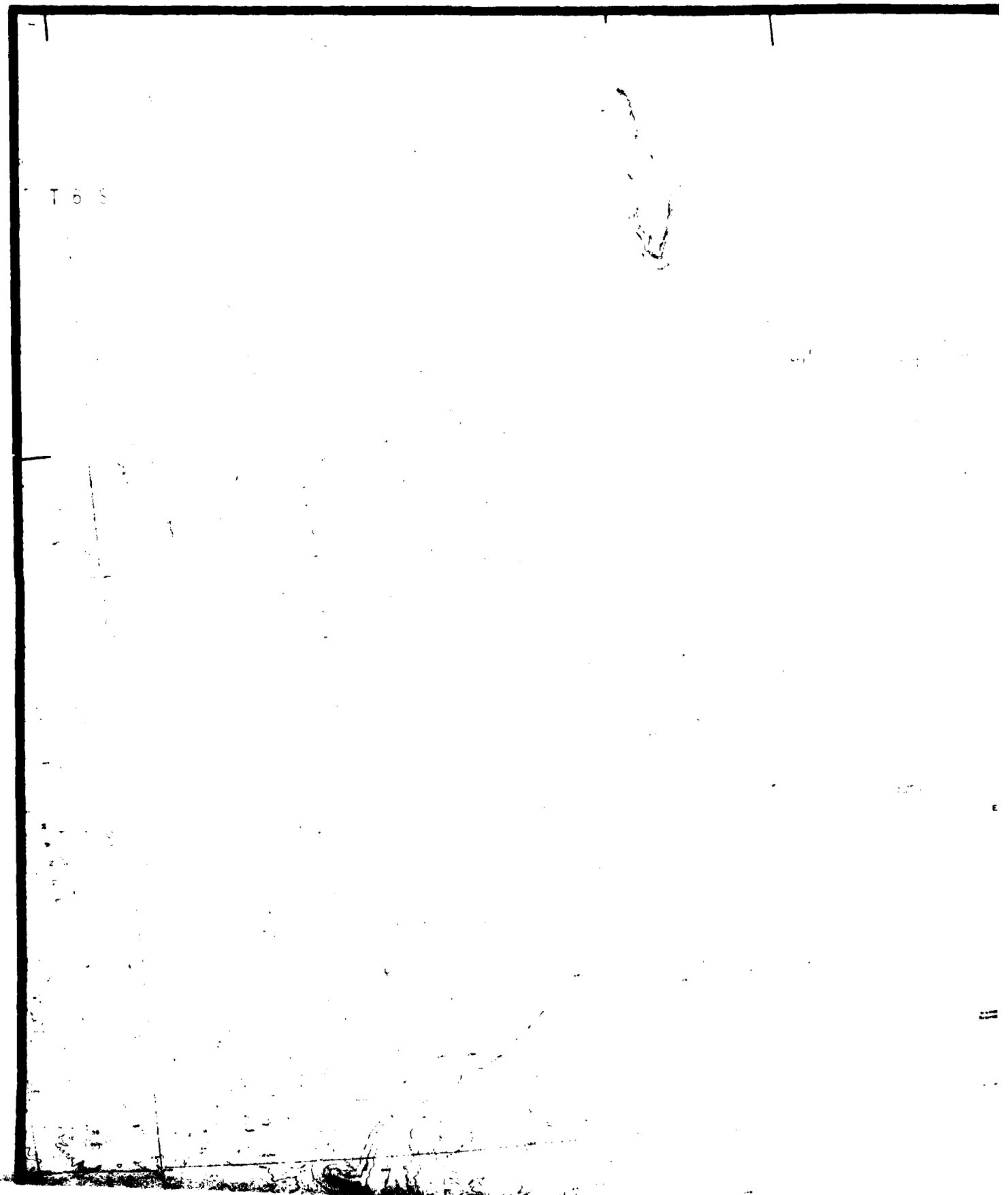
Eaking, T. E., 1964, Ground-water appraisal of Coyote Spring and Kane Springs Valleys and Muddy River Springs area, Lincoln and Clark counties, Nevada: State of Nevada, Dept. of Con. and Nat. Res., Carson City, Nevada, Ground-Water Resources - Reconnaissance Series, Report 25.

Federal Aviation Administration, 1965, Objects affecting navigable airspace: Fed. Aviation Regs., Vol. XI, Part 77.

Howard, E. L., 1978, Geologic map of the Eastern Great Basin, Nevada and Utah: Terra Scan Group Ltd., Lakewood, Colo.

U.S. Department of the Air Force, 1974, Airfield and Airspace Criteria, Air Force Manual 86-8.

U.S. Department of Health, Education, and Welfare, 1962, Public Health Service drinking water standards: Public Health Service Pub. no. 956.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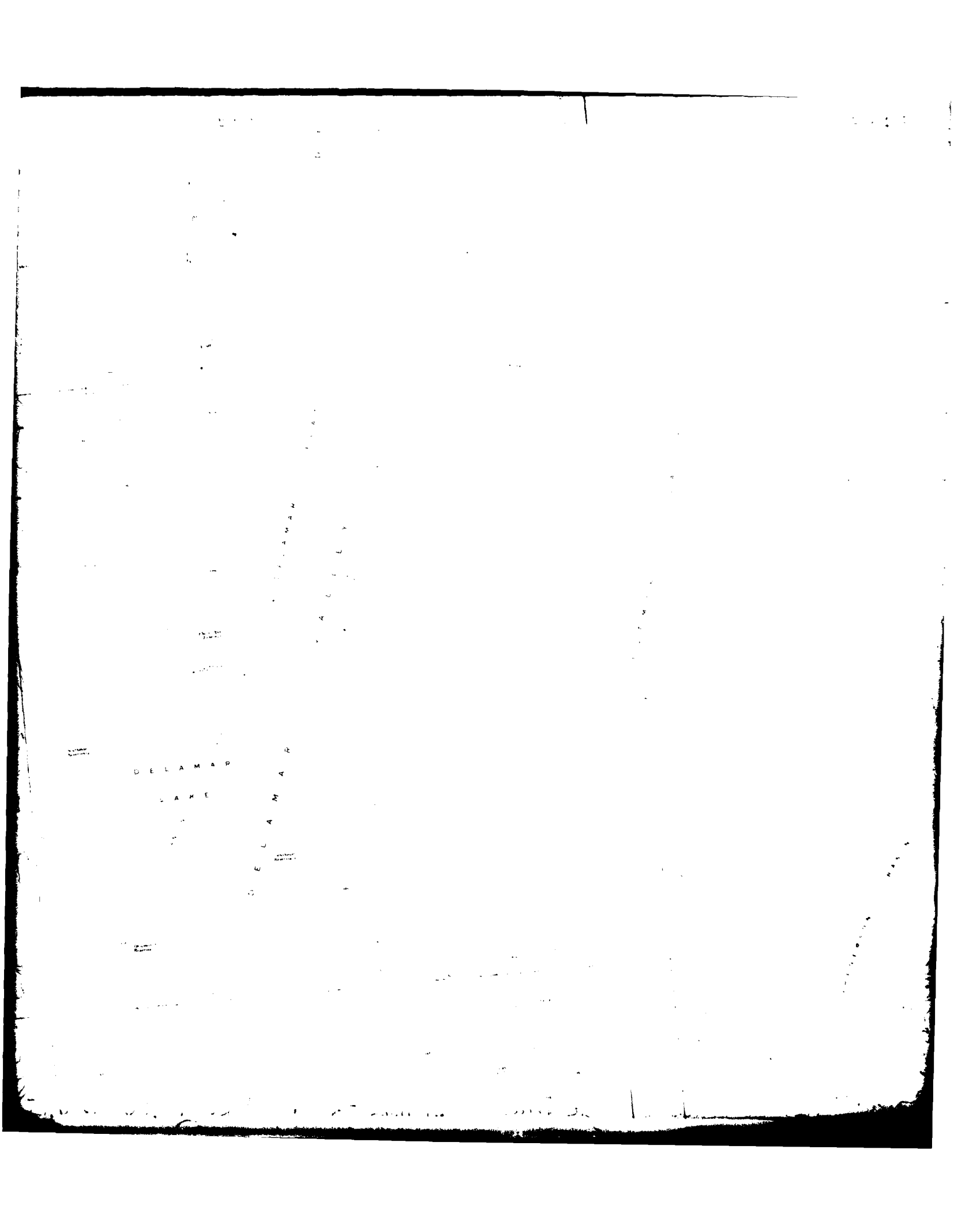
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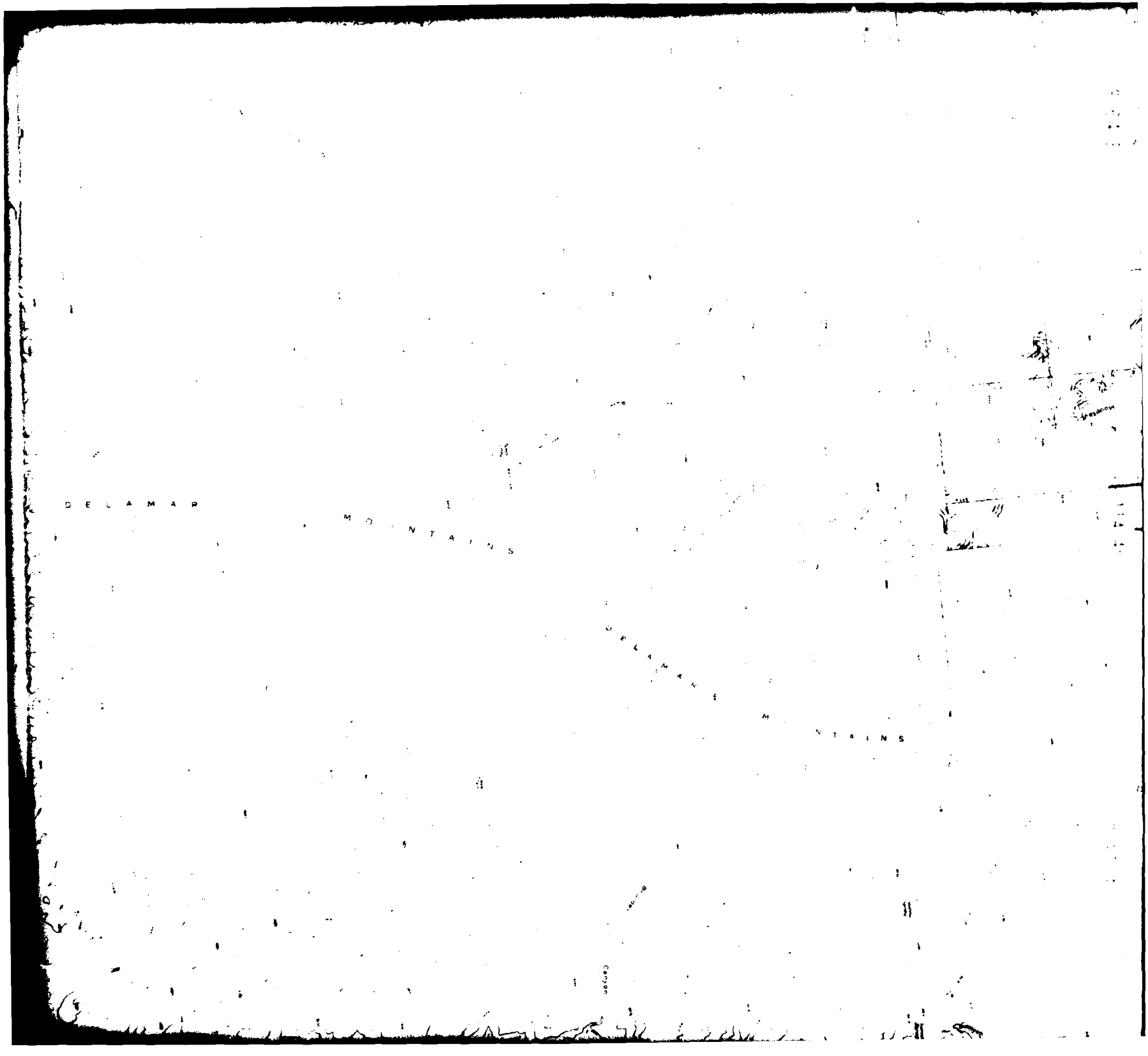
LAKE
DELAMAR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MOUNTAINS
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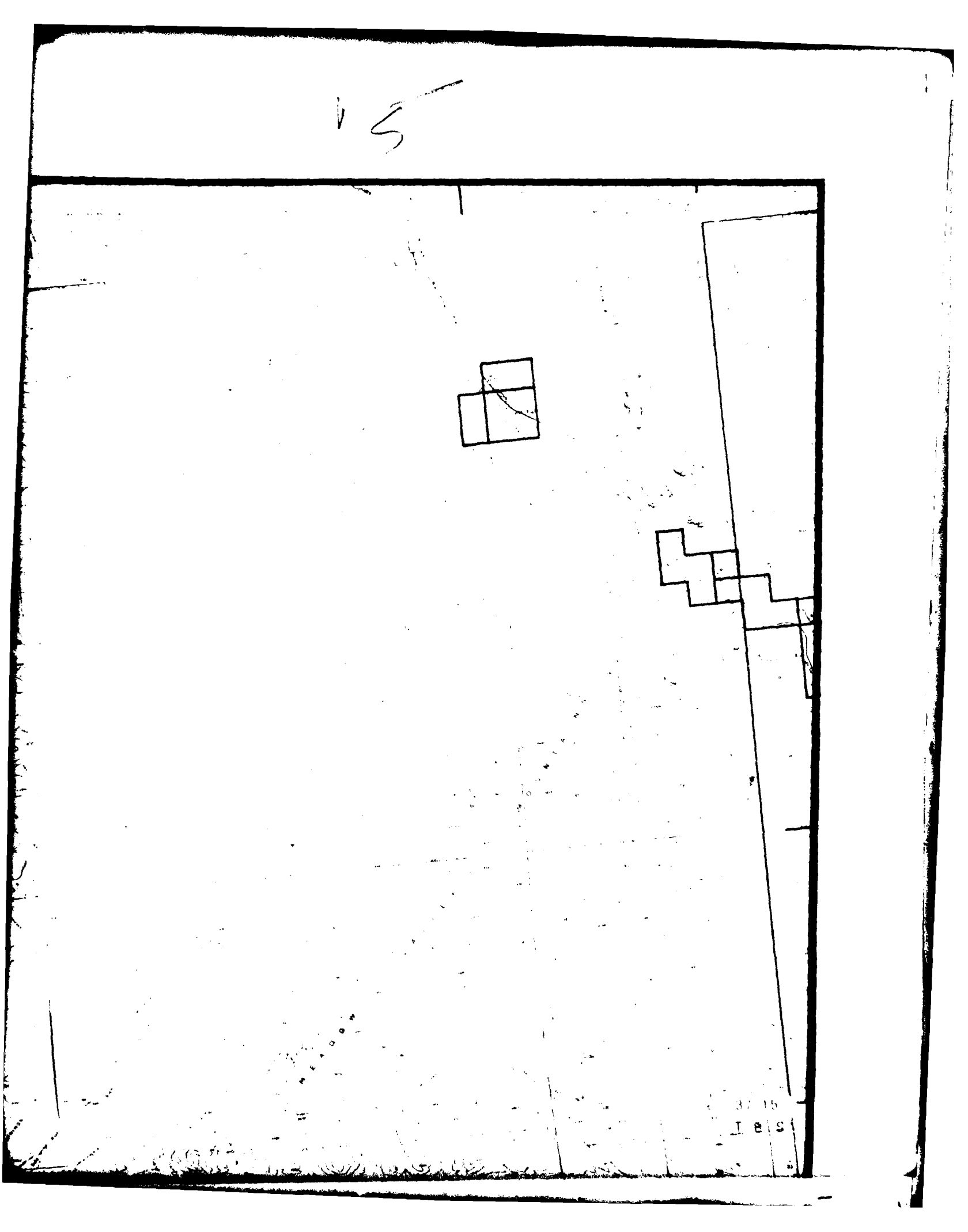

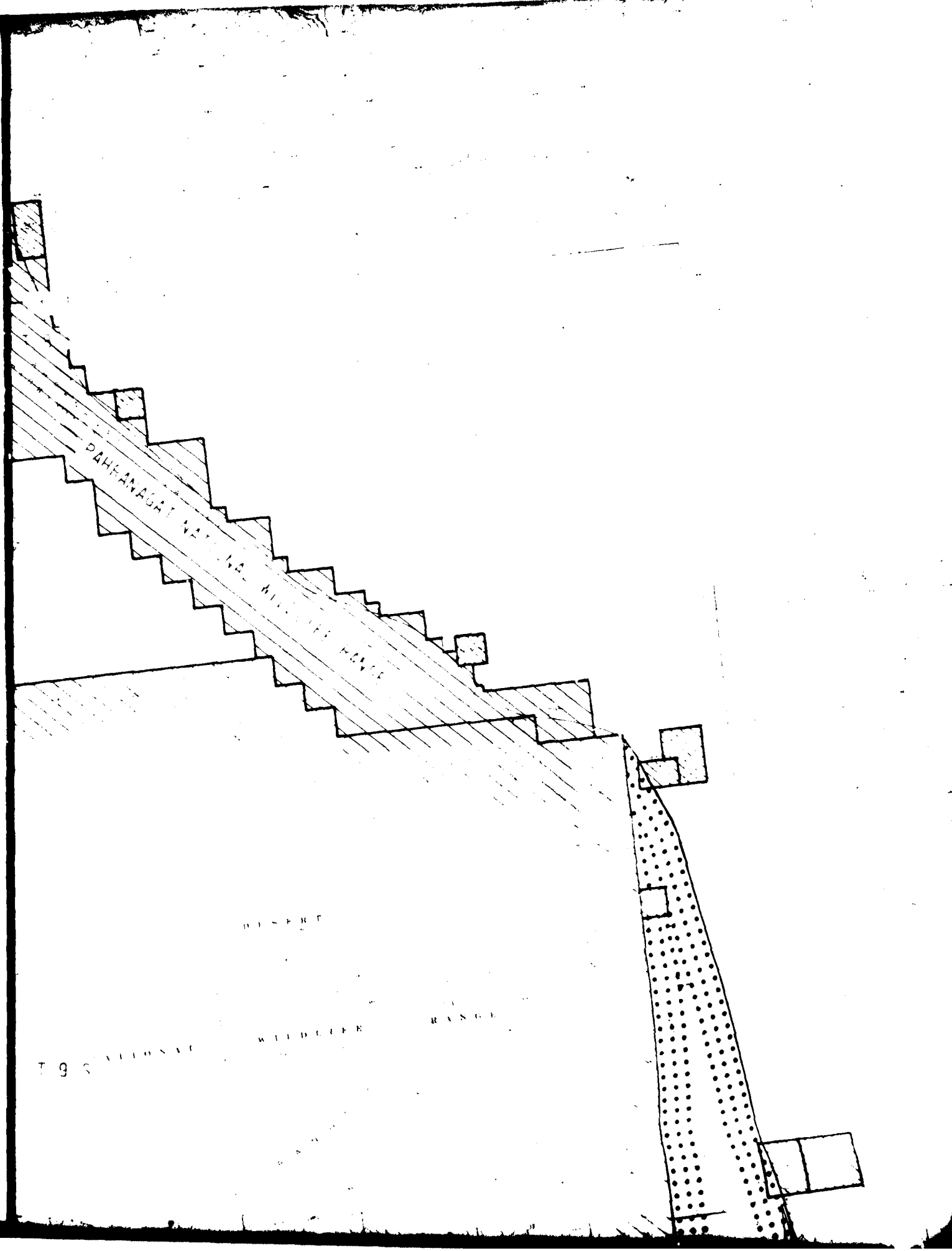
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DESERT
RANGE
WILDLIFE
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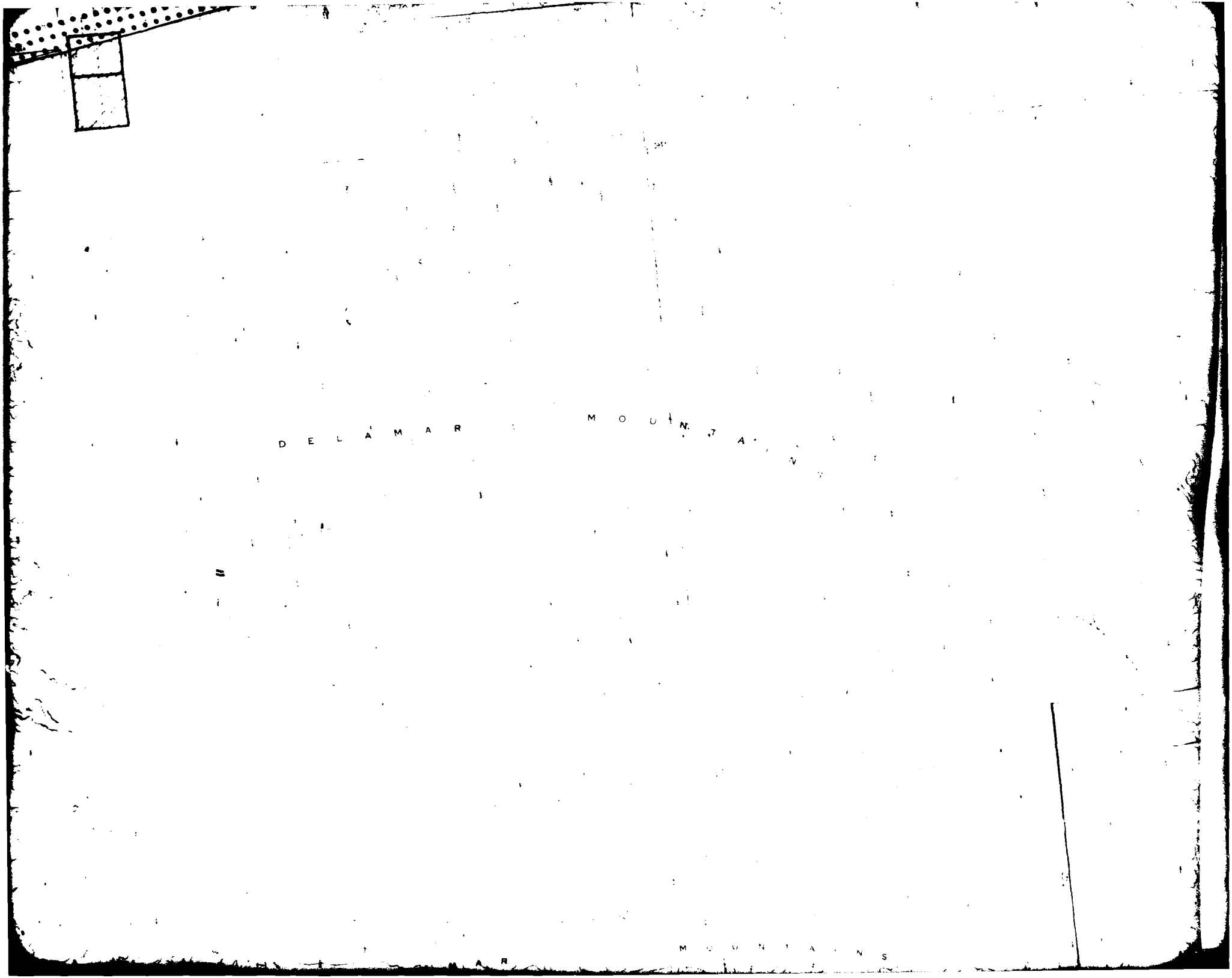
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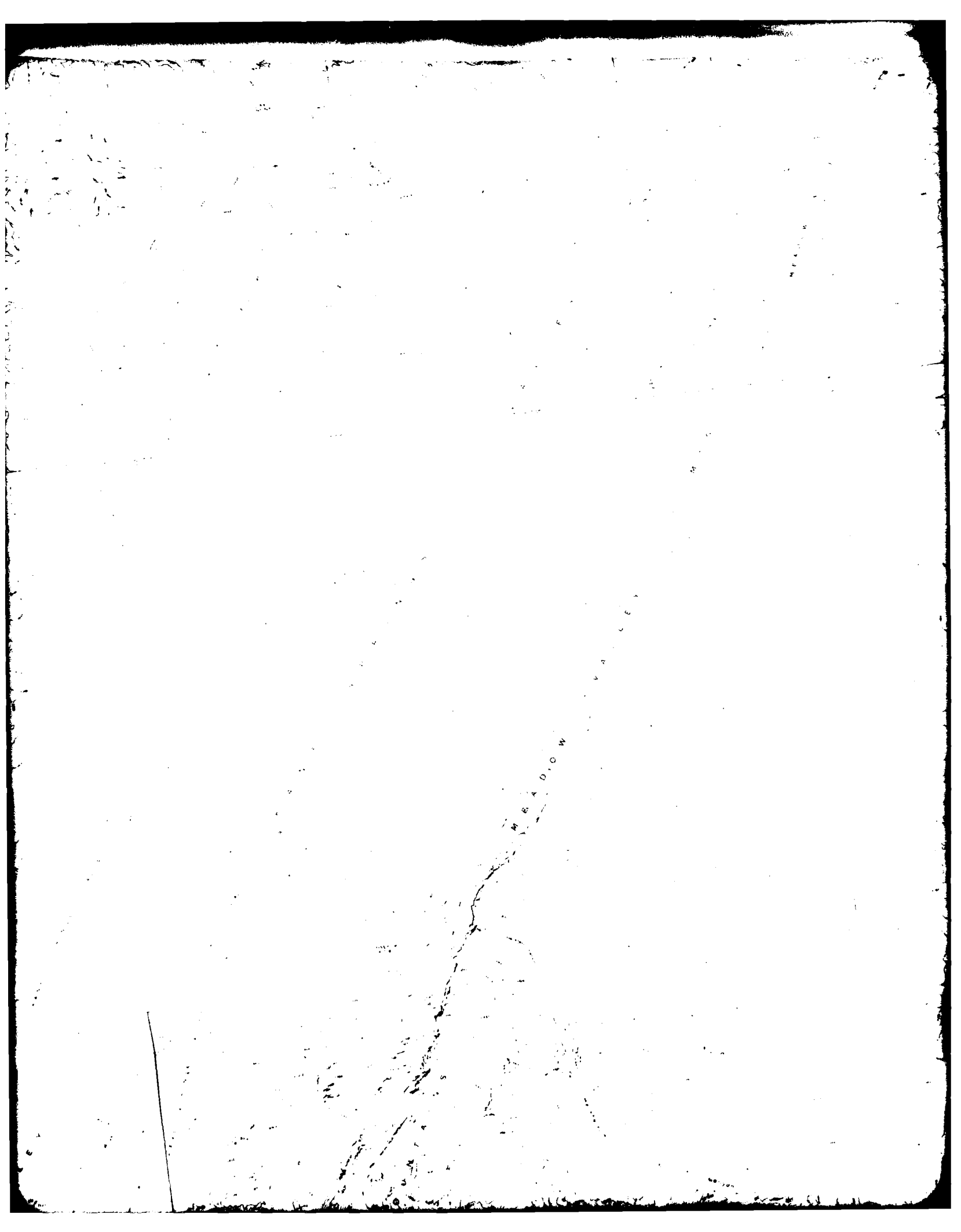
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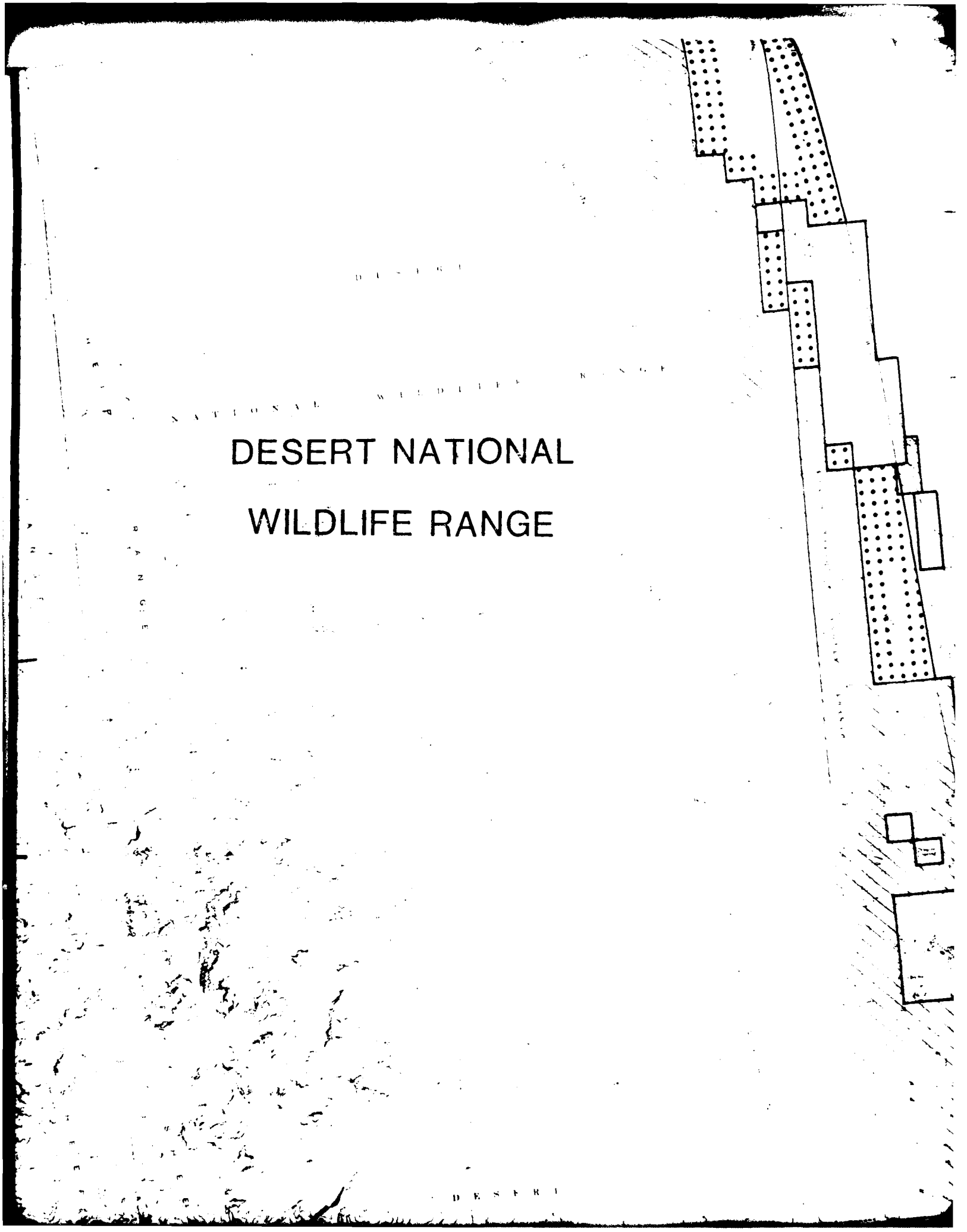
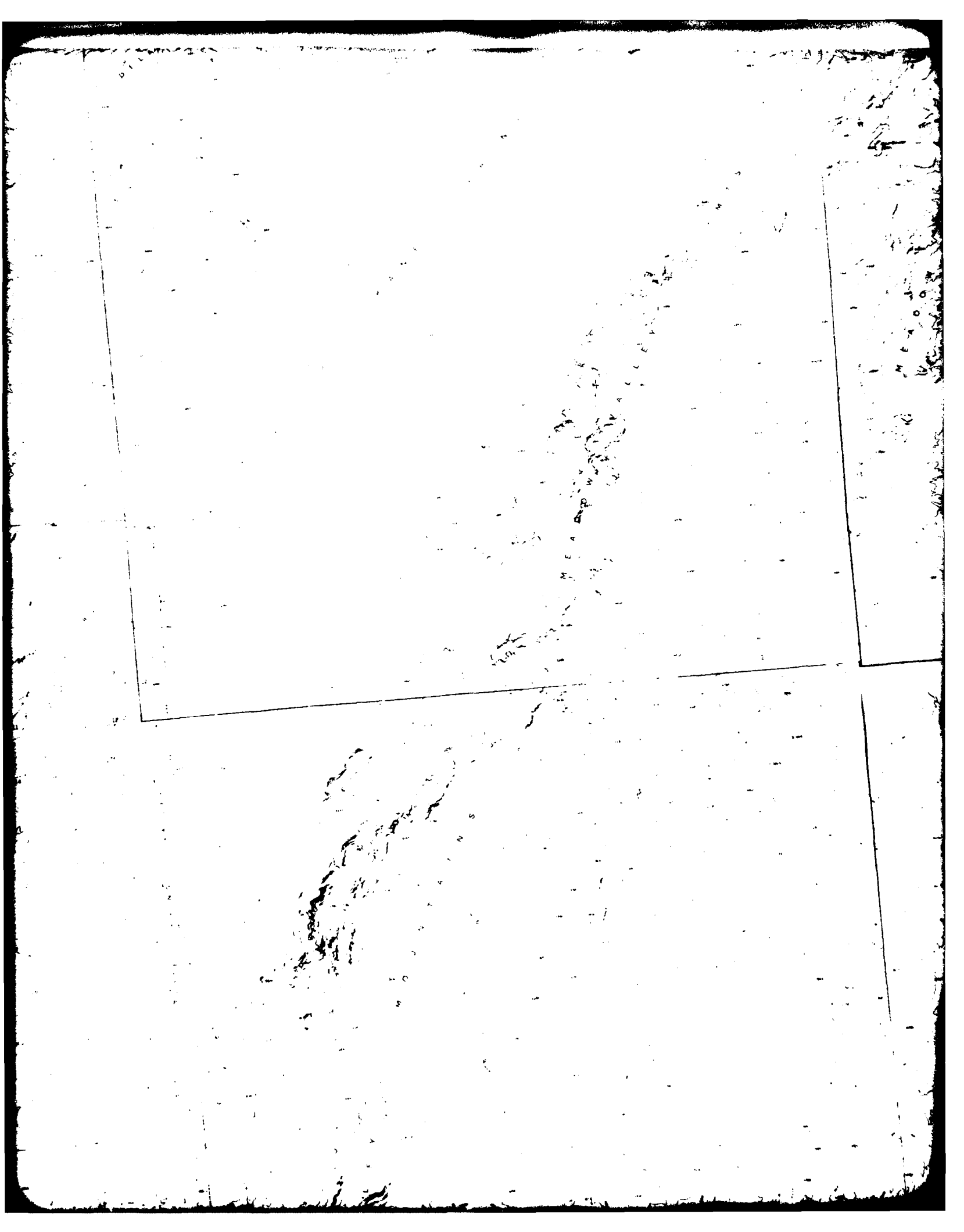
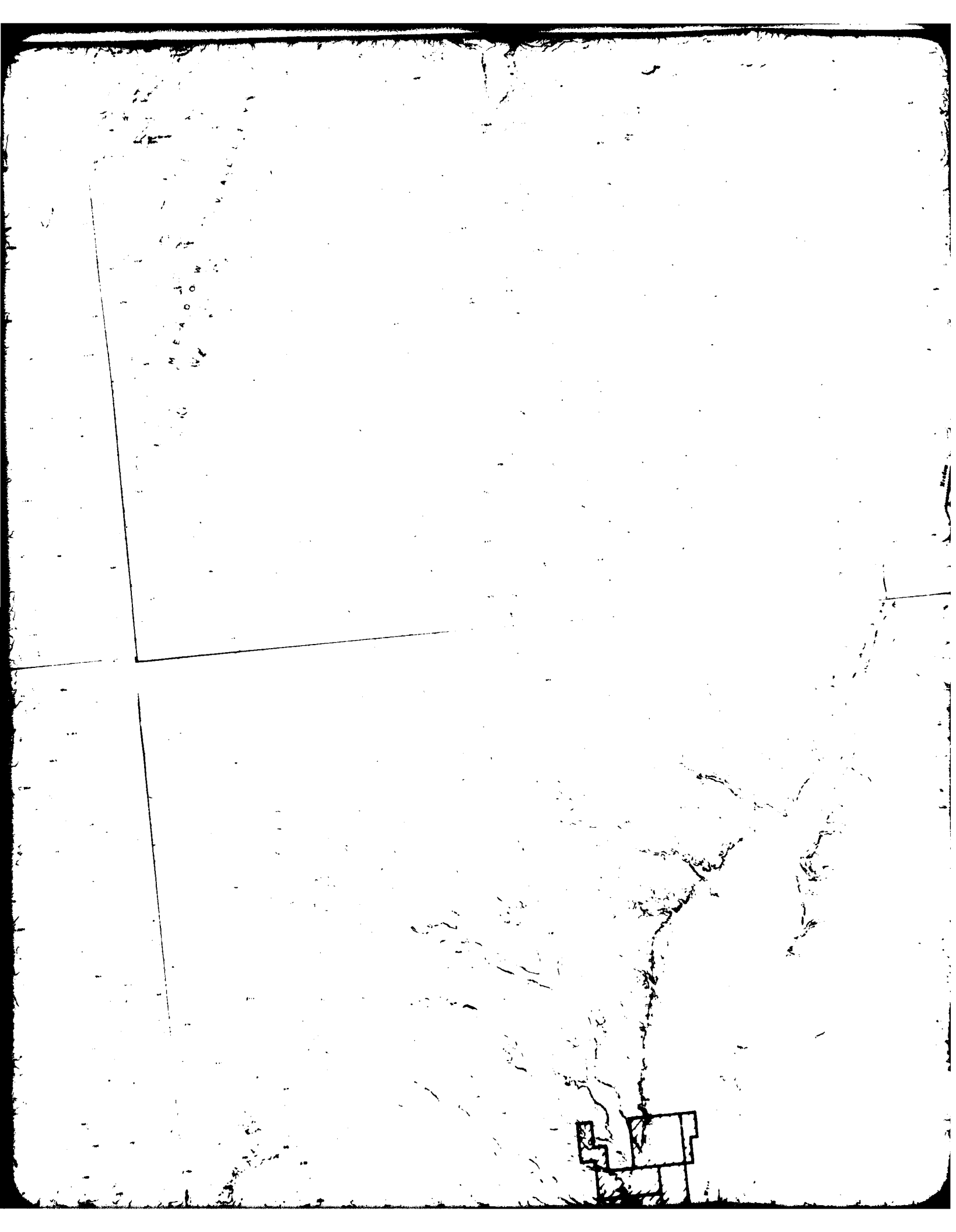


DESERT NATIONAL

WILDLIFE RANGE


M O U N T A I N S
C O Y O T E S P R I N G

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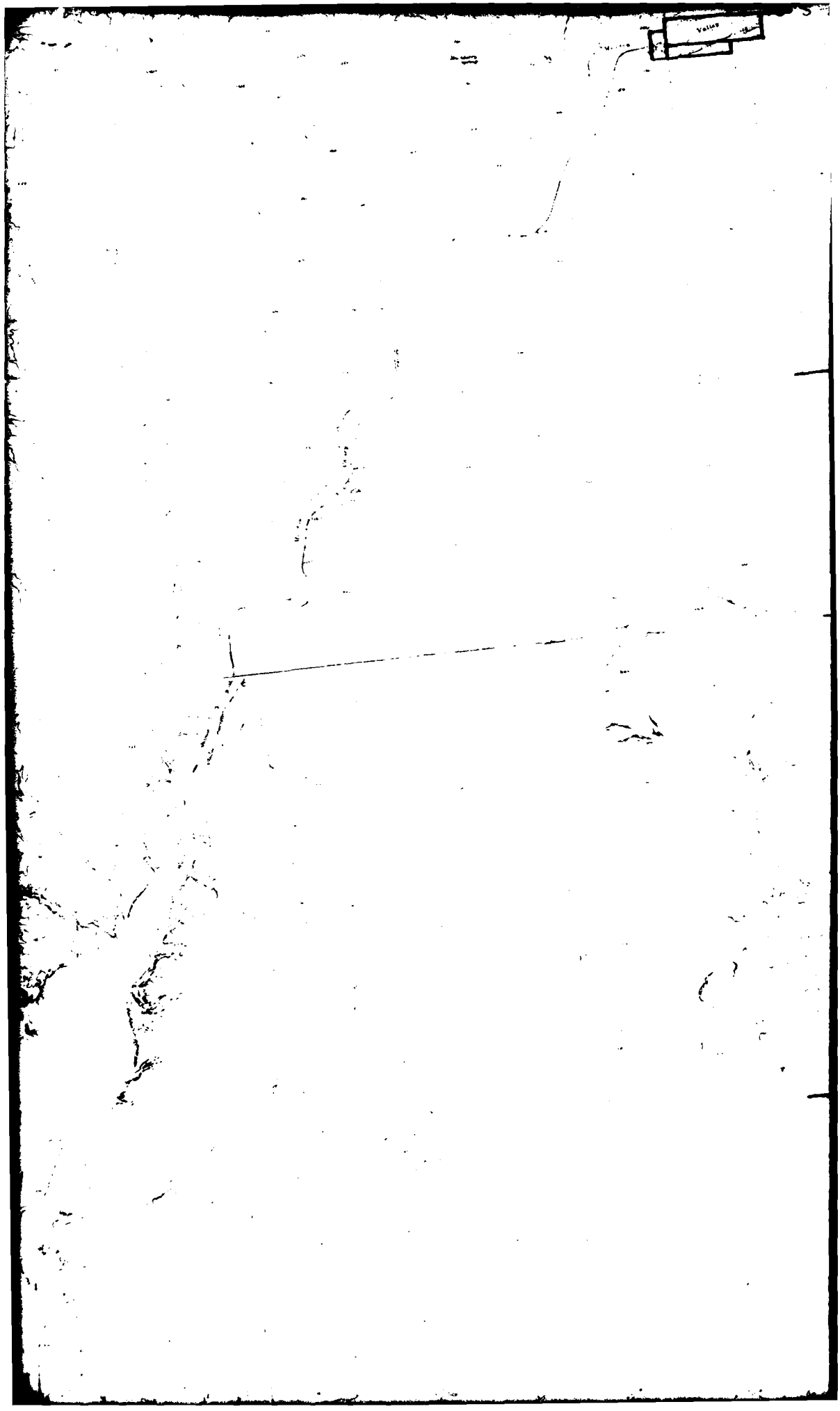
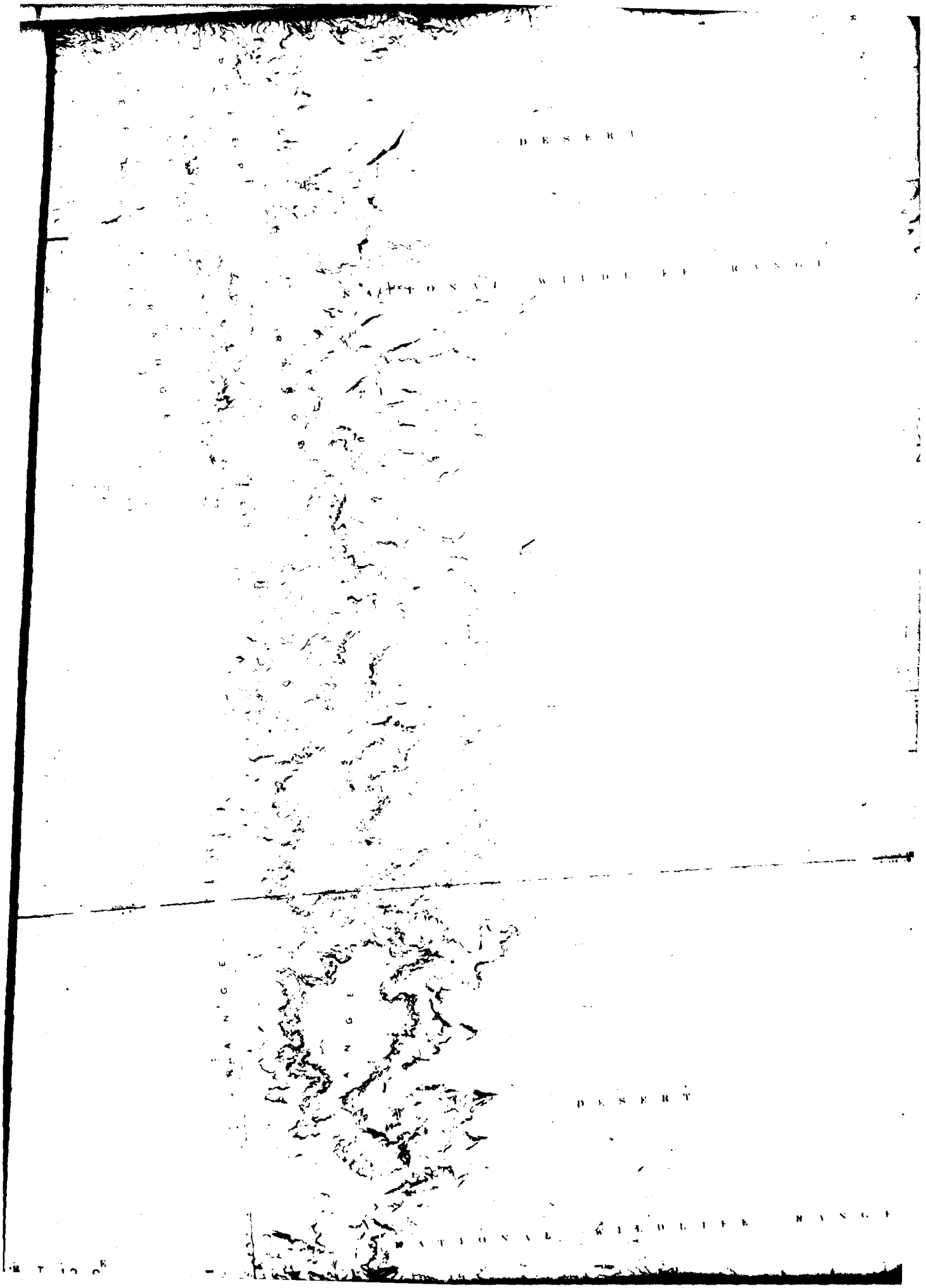
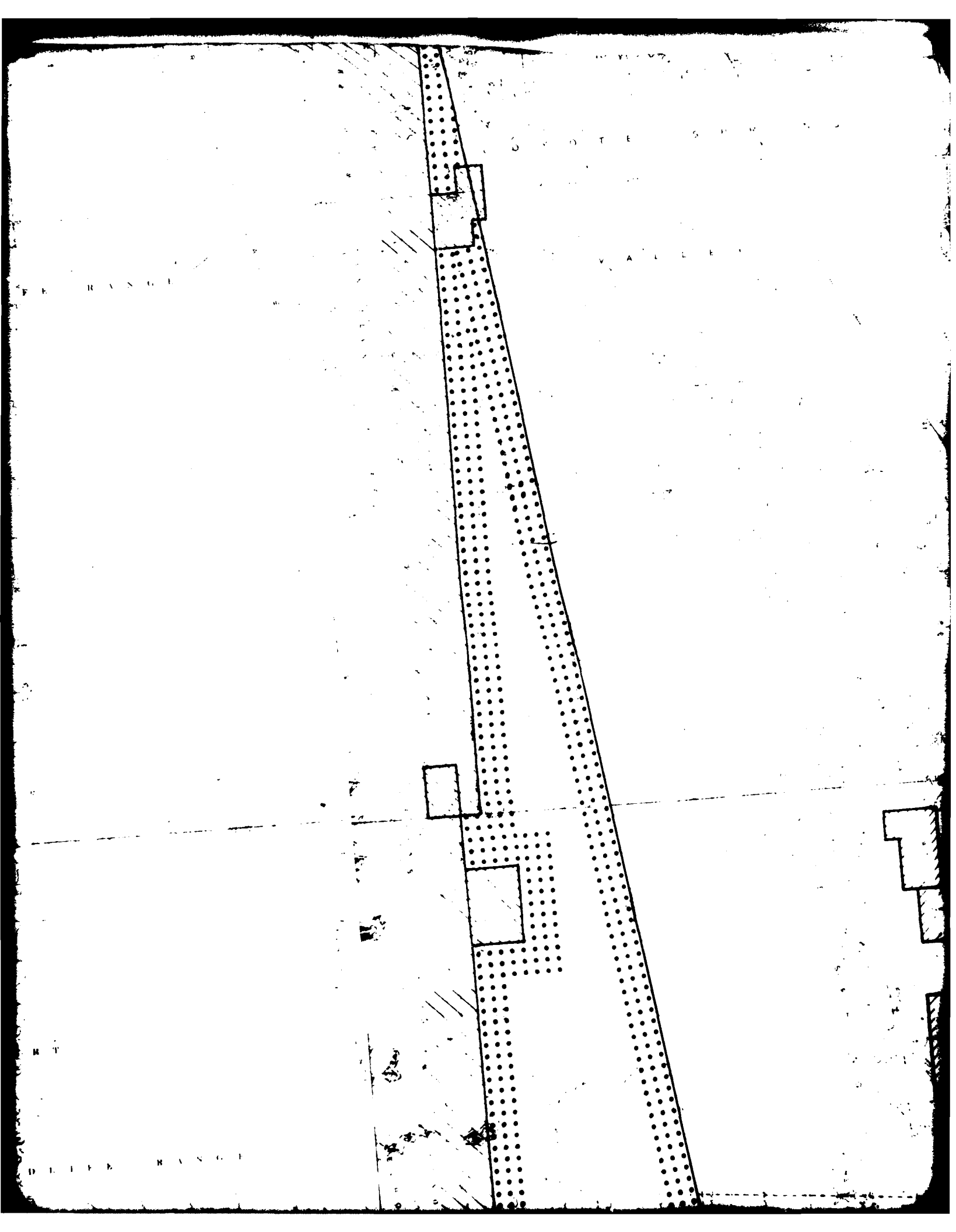
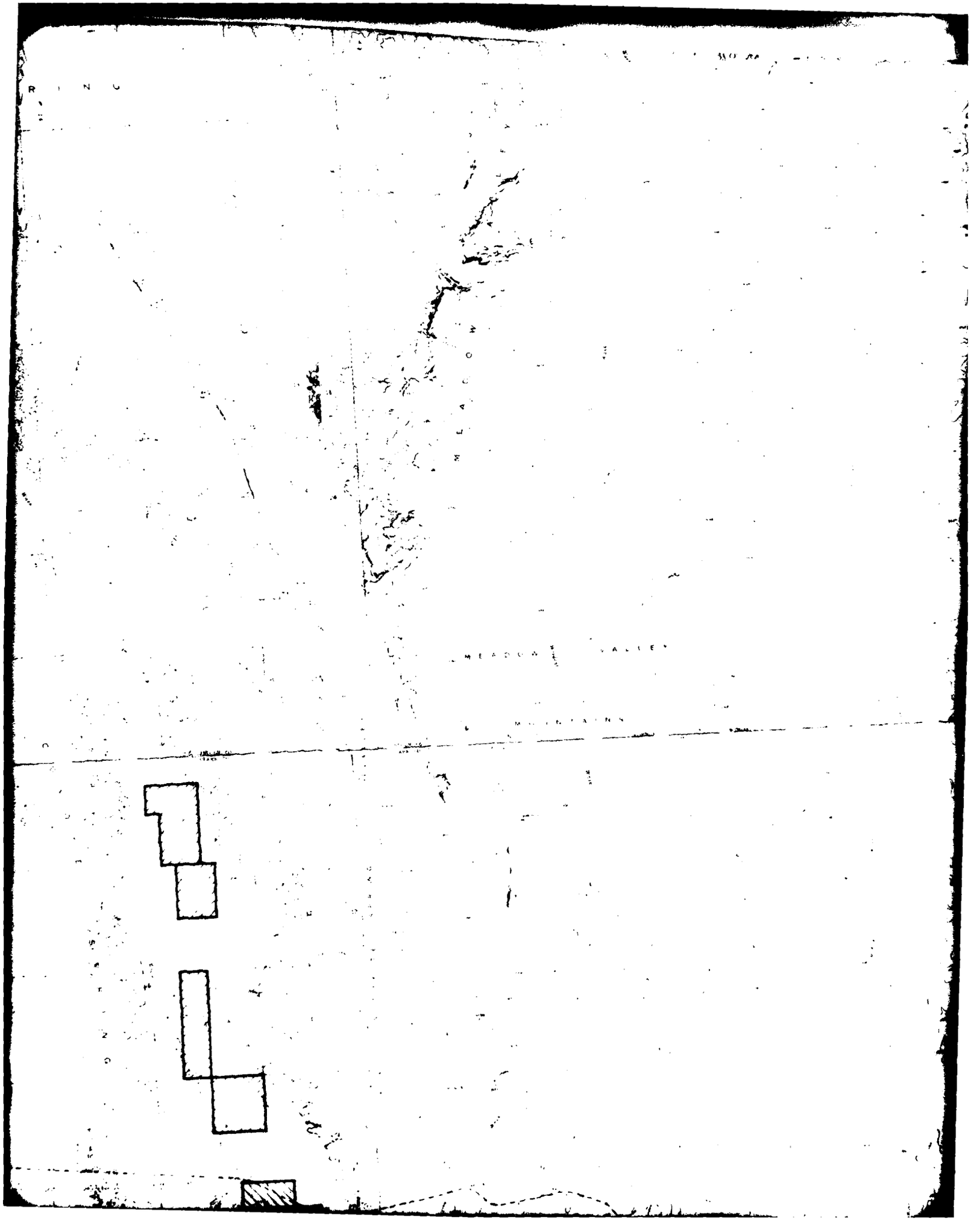
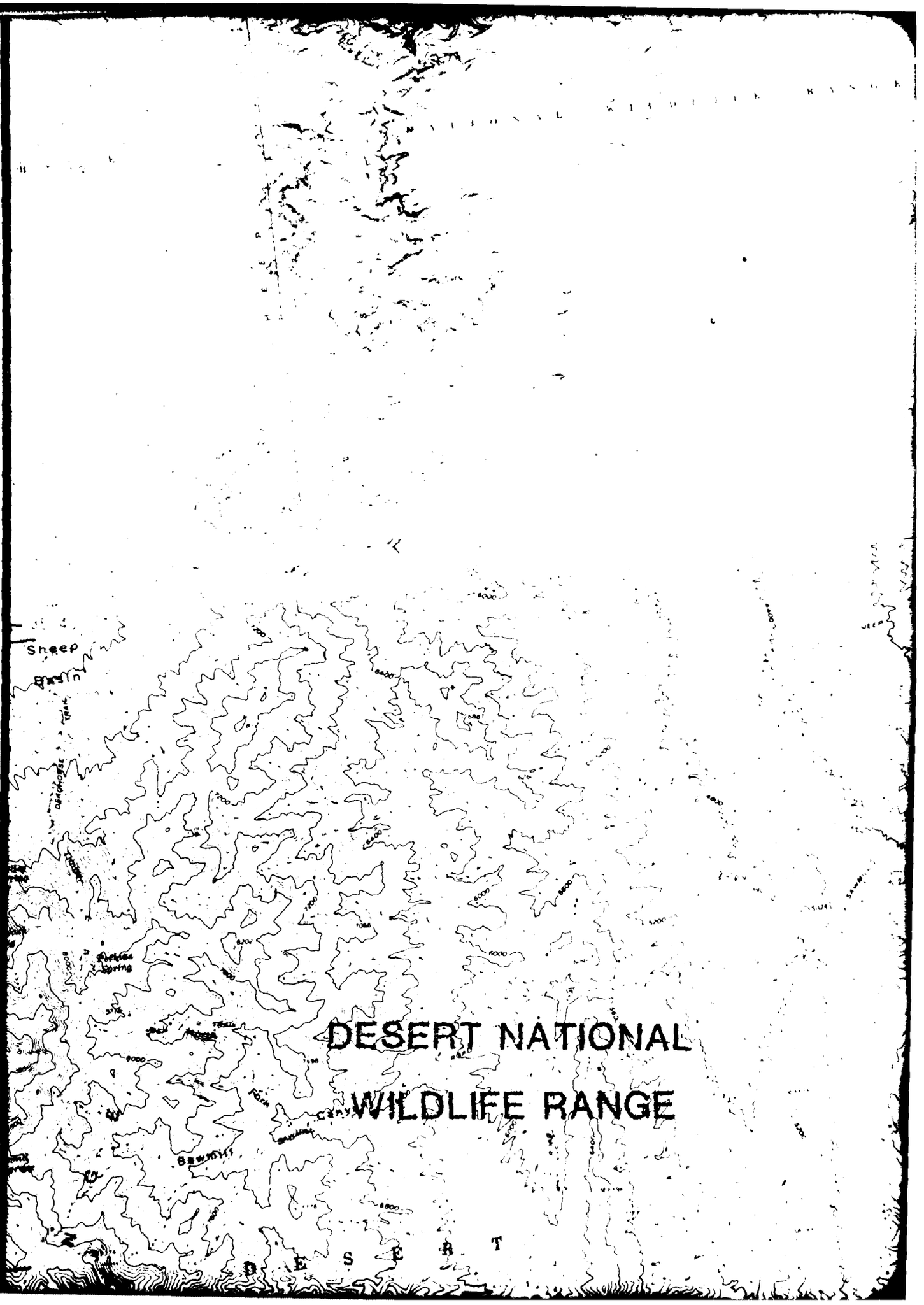


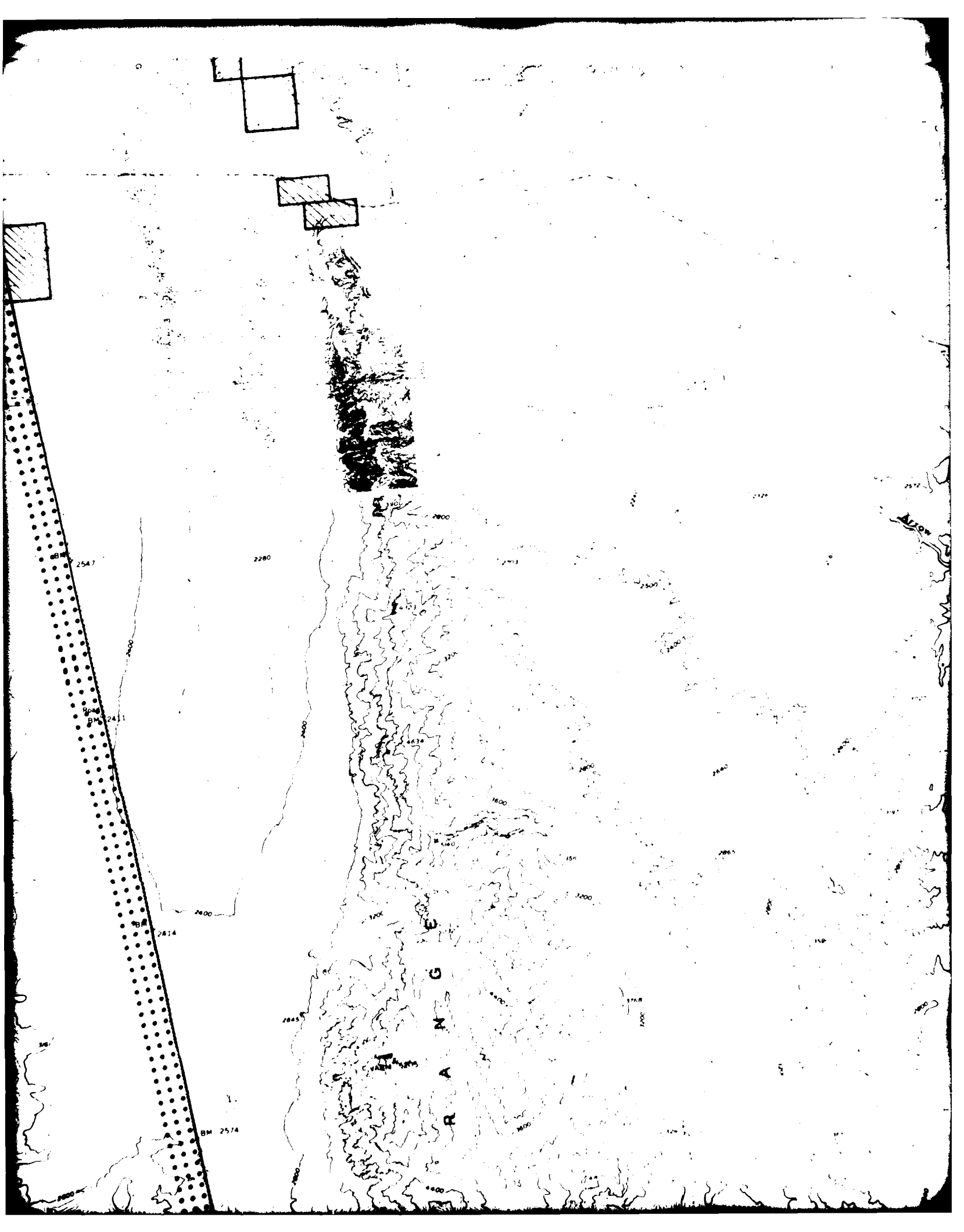

DESERT
DESERT




MEADOW VALLEY
MOUNTAINS


Sheep
Basin
DESERT NATIONAL
WILDLIFE RANGE
D E S E R T

SAWMILL
Canyon
Elbow
ROAD
TRAIL
JEEP
Elbow Canyon
ROAD
BOUNDARY
BM 2576
RANGE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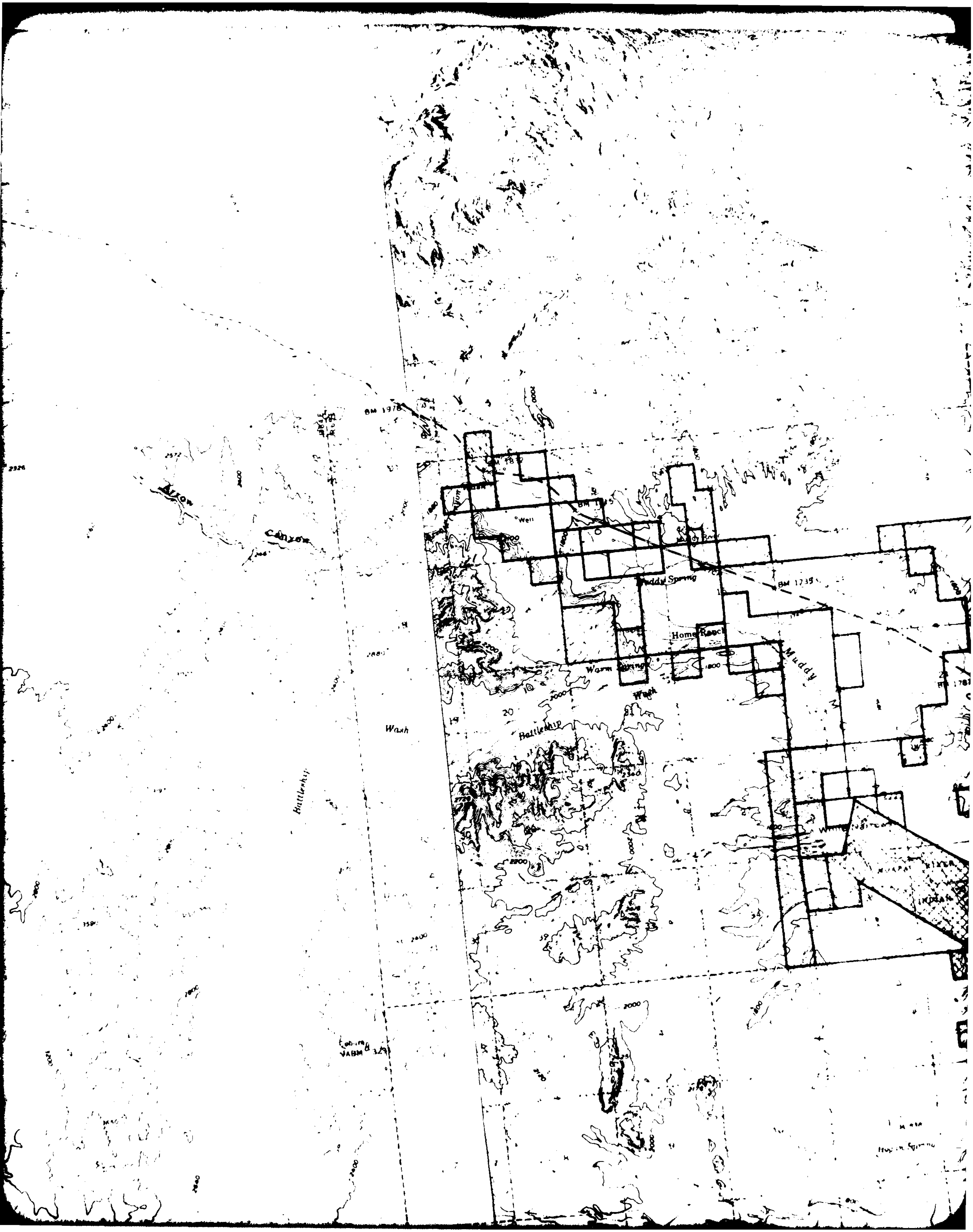
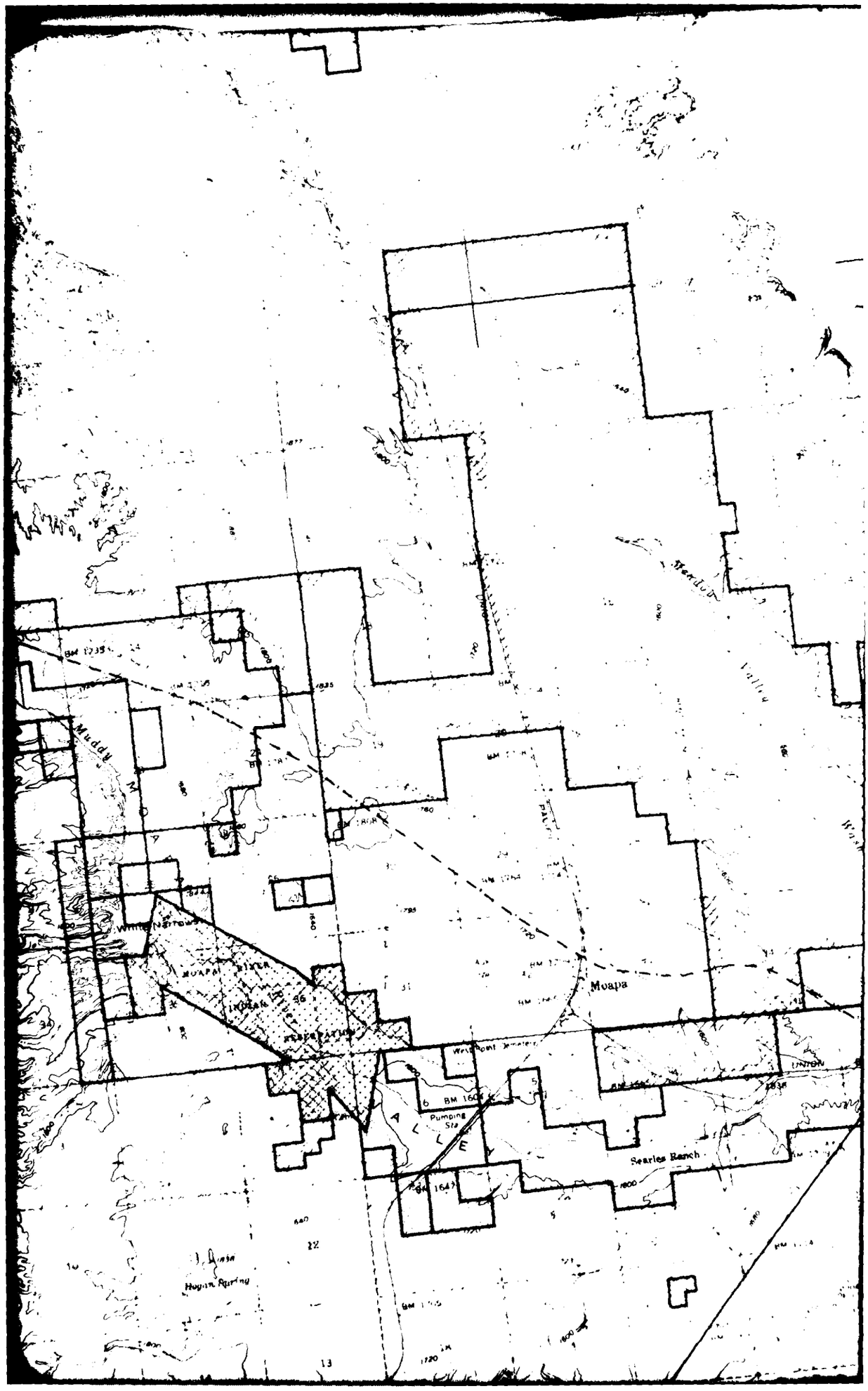
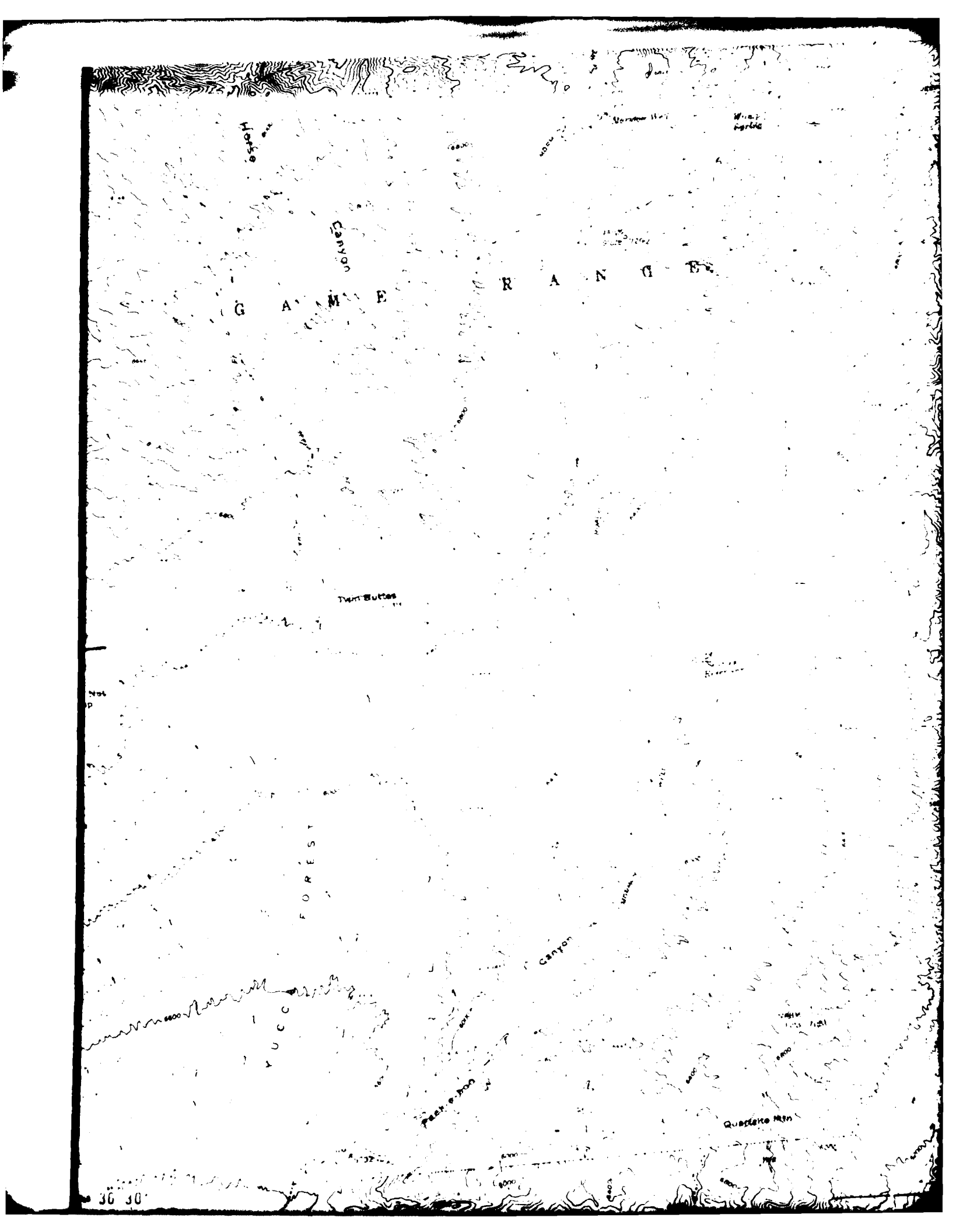
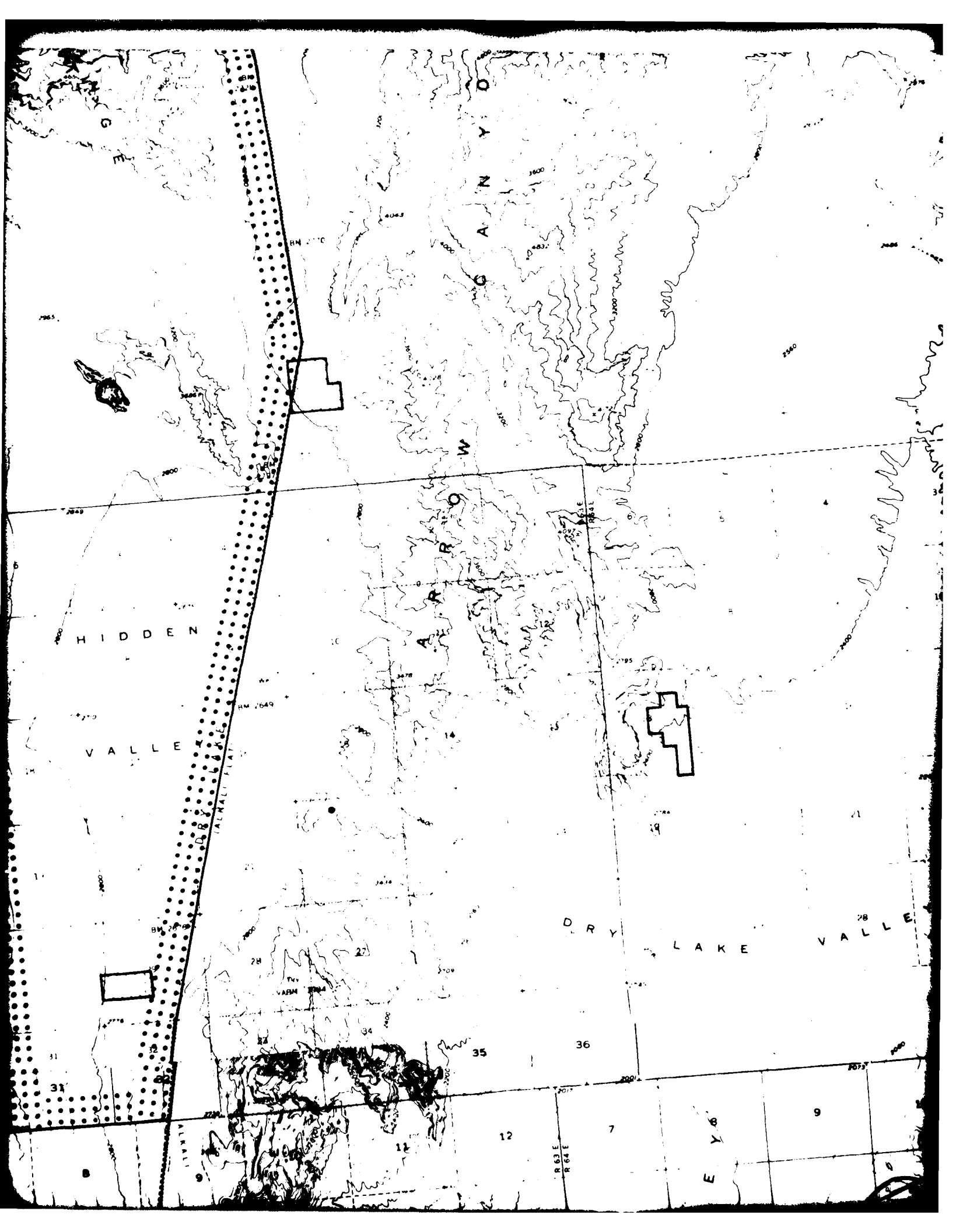

Arrow
Canyon
BM 1978
Well
Muddy Spring
BM 1735
Home Ranch
Warm Springs
Wash
Muddy
Battleship
Wash
Battleship


Muddy River
Meadow Valley Wash
Moapa
Searles Ranch
Pumping Sta
Hidden Spring
INDIAN RESERVATION
MOAPA RIVER
VALLEY
UNION
BM 1647
BM 1635
BM 1720
1600
1700
1800
1900
1720
13
22


G A M E
R A N G E
Twin Buttes
F O R E S T
Canyon
Quartzite Mtn
30 30

LAS VEGAS RANGE
DESERT
NATIONAL
HIDDEN
VALLEY
Hidden Valley
Quadalupe Mtn
31


HIDDEN
VALLE
ARROW
CANYON
DRY
LAKE
VALLE
R63E
R64E
35
36
12
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9
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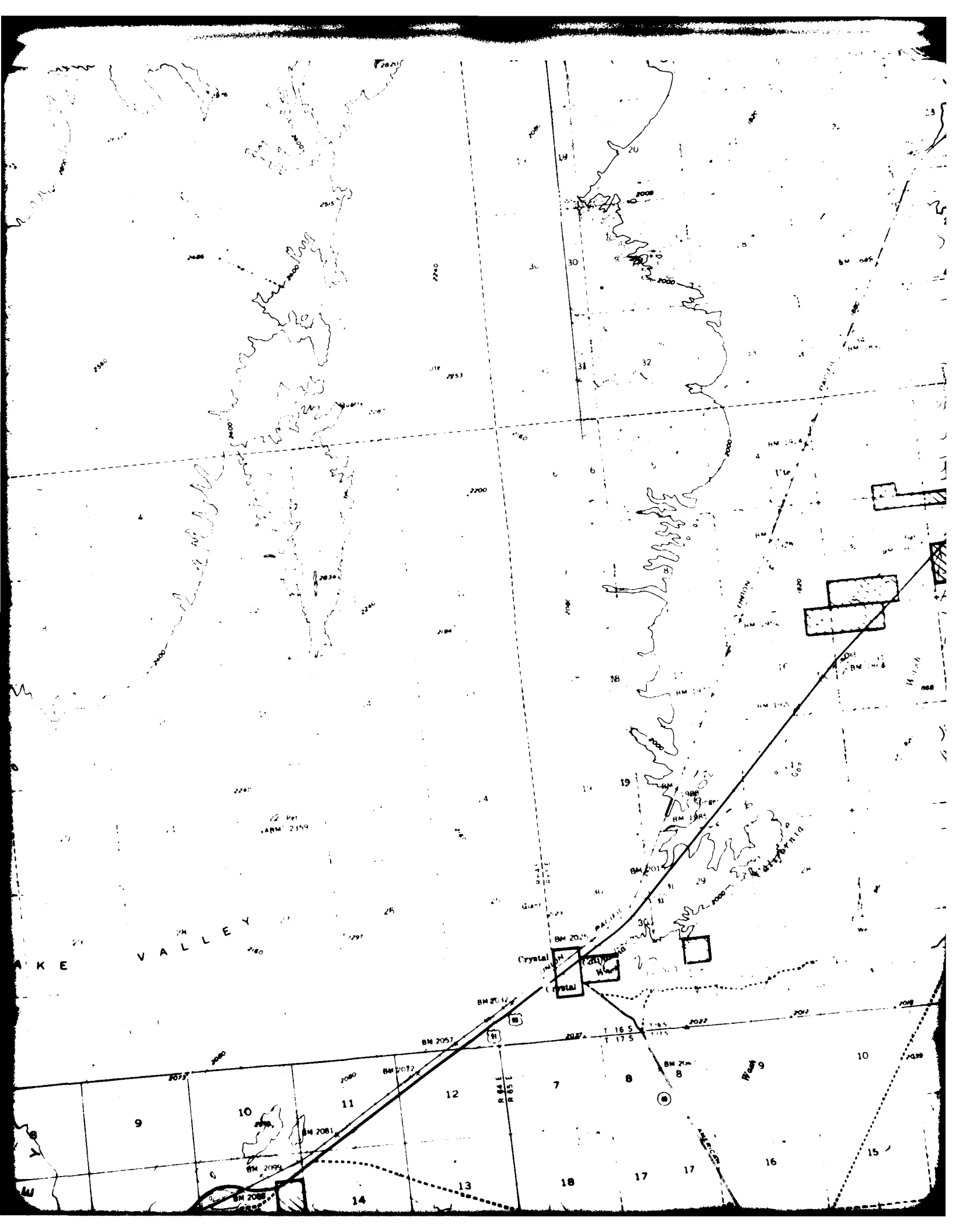
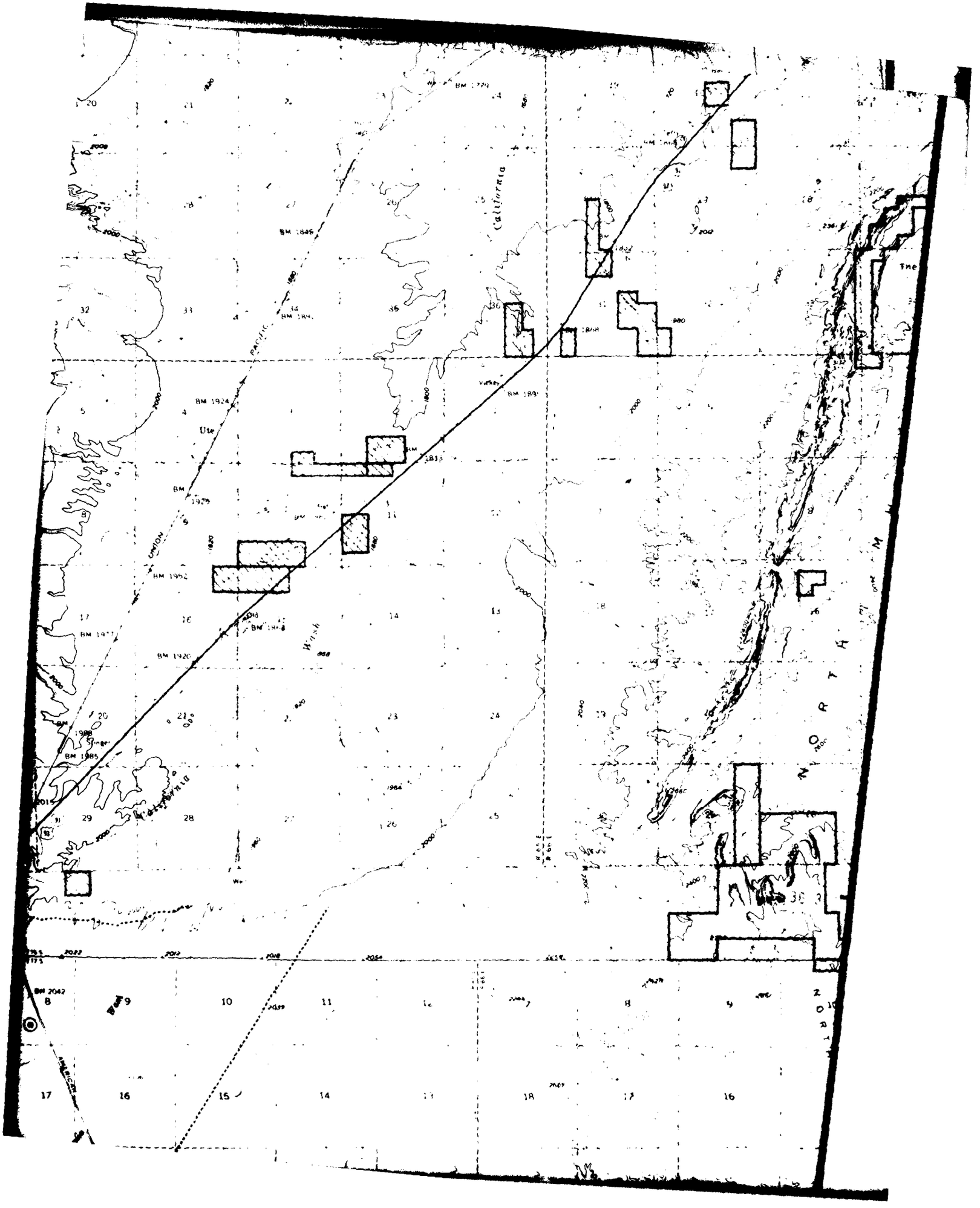
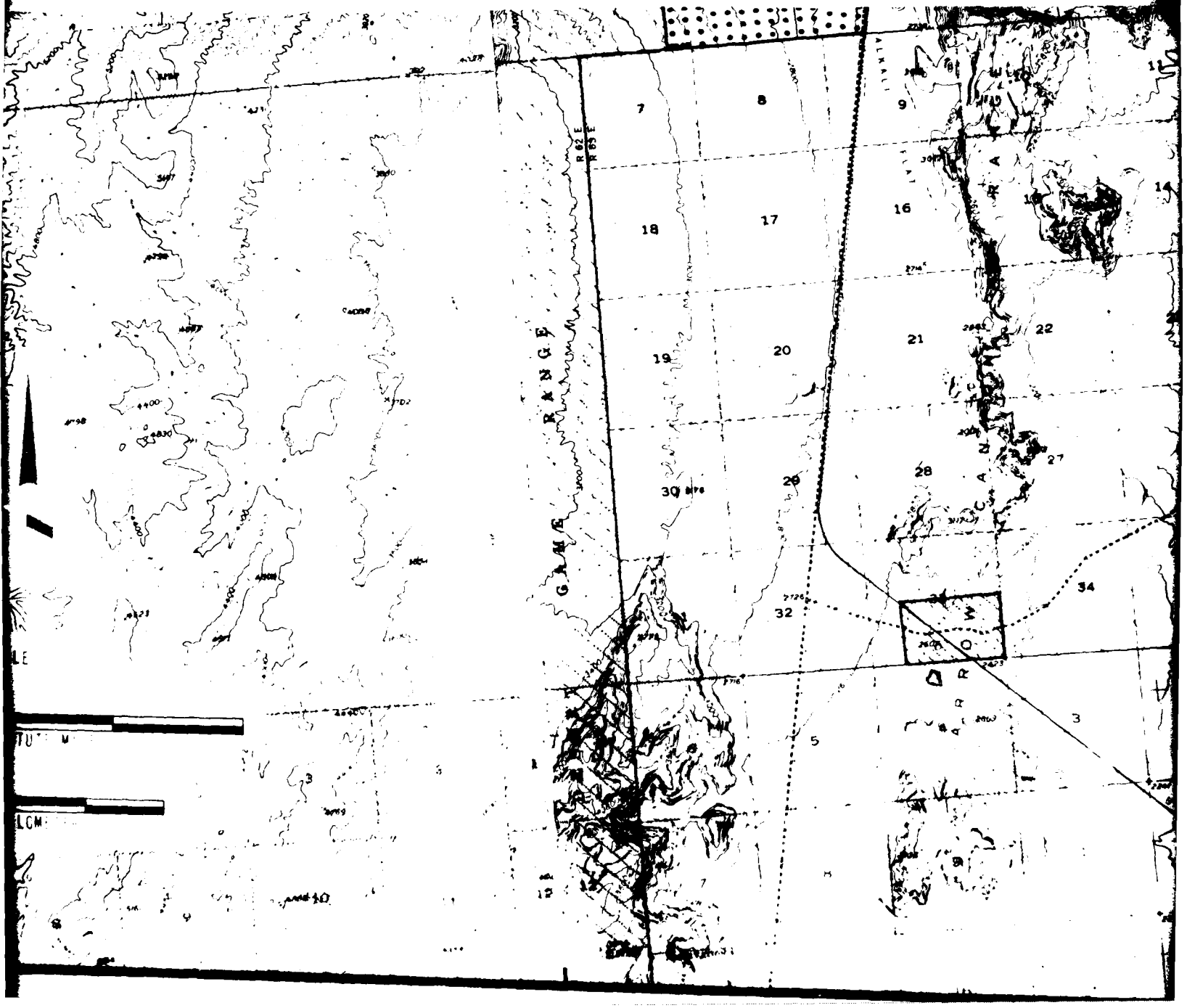
31
6
1
2


K E V A L L E Y
Crystal
BM 2057
BM 2072
BM 2081
BM 2099
BM 2088
T 16 S
T 17 S
R 45 E
R 46 E


California
PACIFIC
UNION
Ute
Wash
NORTH
BM 1924
BM 1929
BM 1952
BM 1947
BM 1920
BM 1988
BM 1985
BM 2042
BM 1845
BM 1884
BM 1889
BM 1833
BM 1979
BM 1978
Timber
Wash
AMERICAN


FOREST
DESERT
MILES
KILOMETERS


GAME RANGE
R62E
R63E
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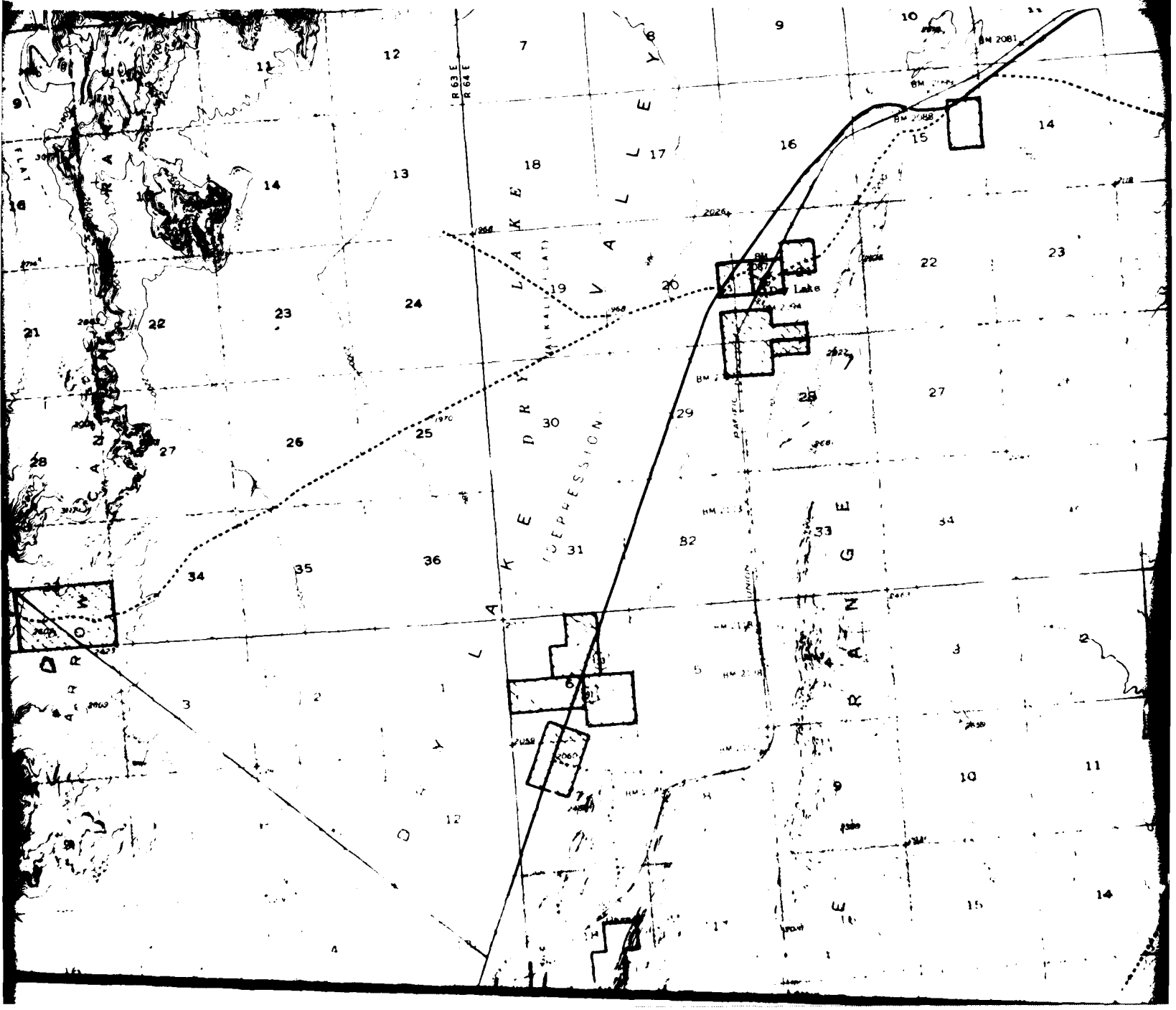
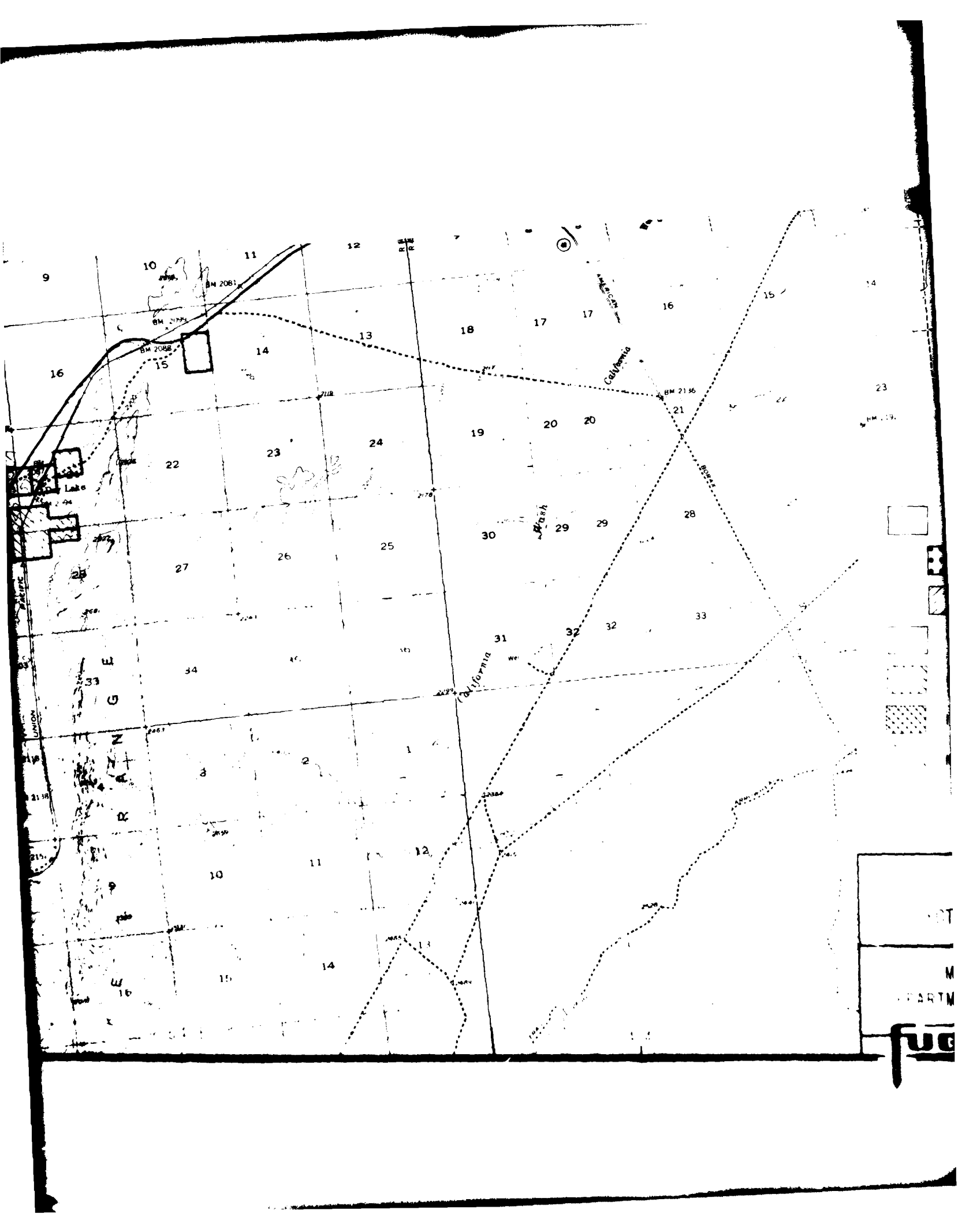

LAKE VALLEY
DRY LAKE (DEPRESSION)
R 63 E
R 64 E
BM 2081
Lake
PACIFIC UNION


BM 2081
BM 2088
BM 2136
Lake
California
Ranch
UNION
PACIFIC
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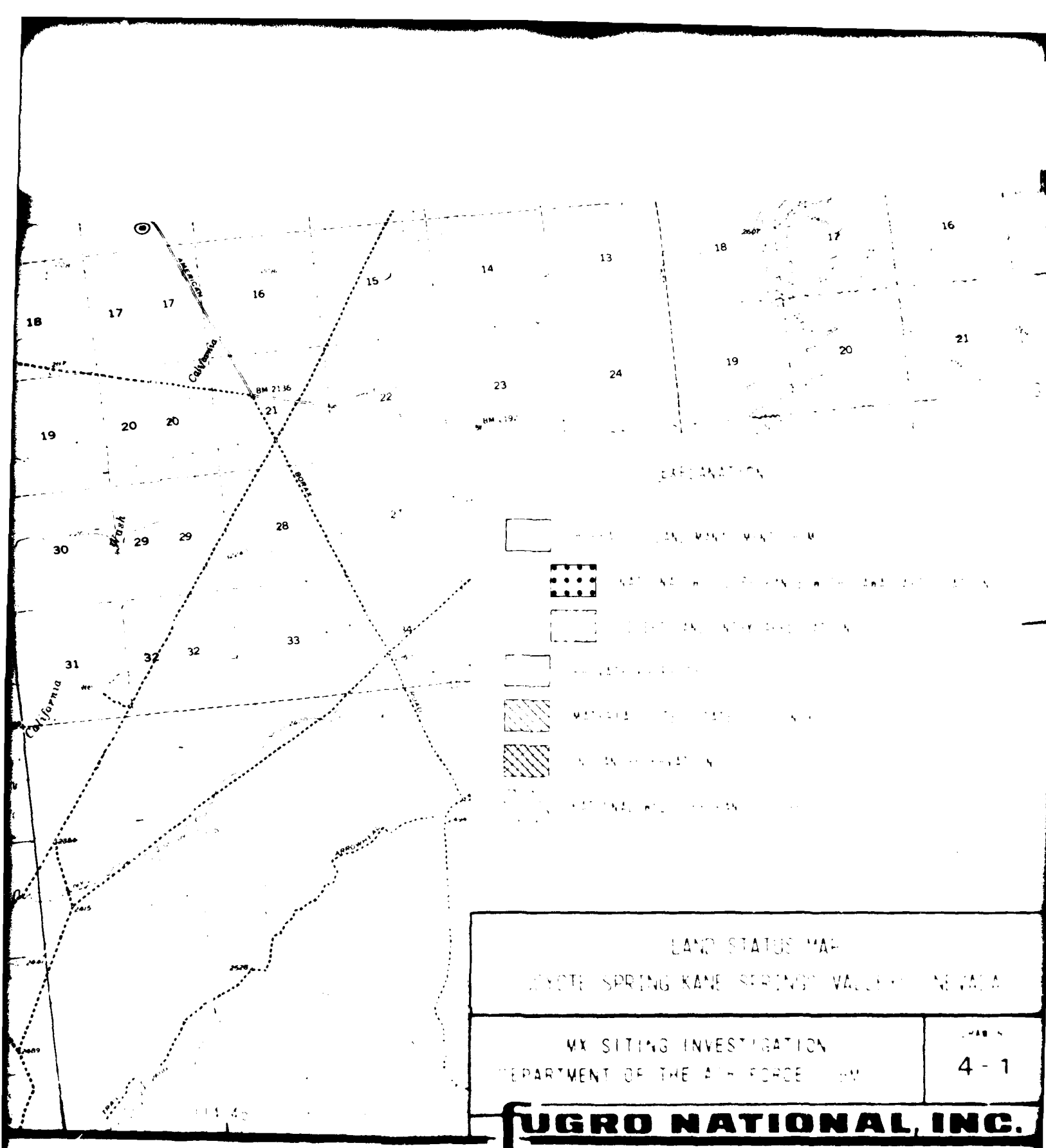
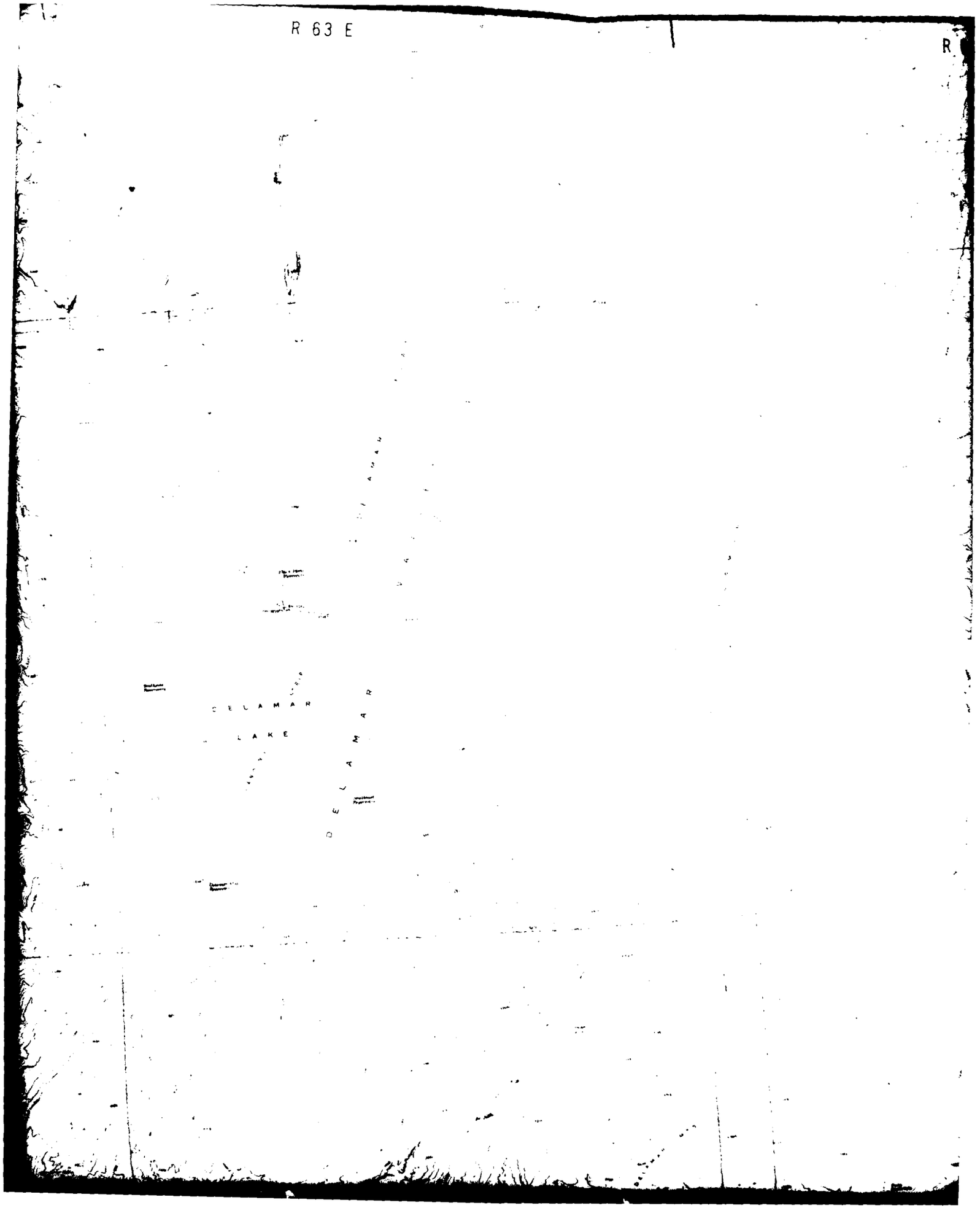
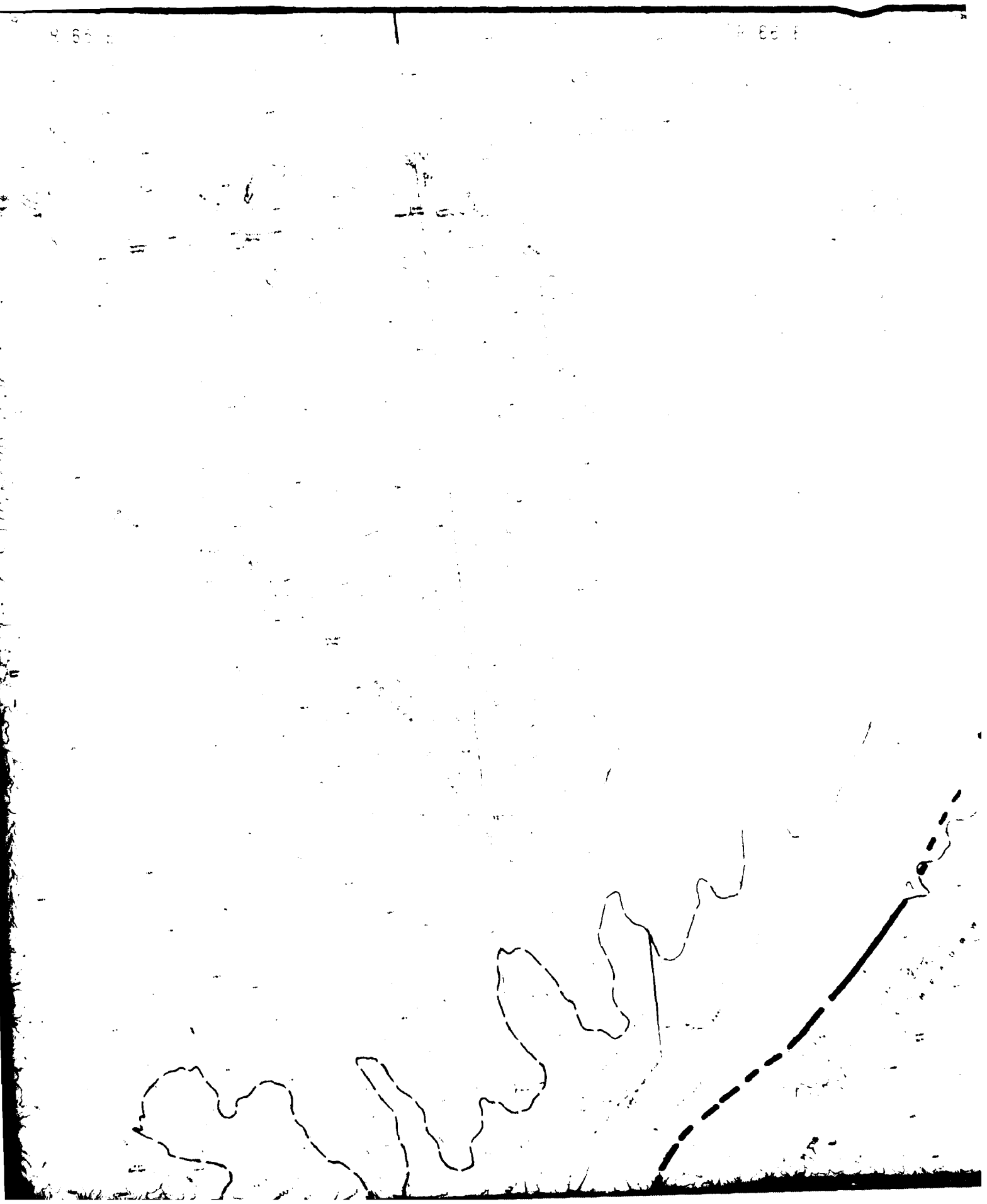
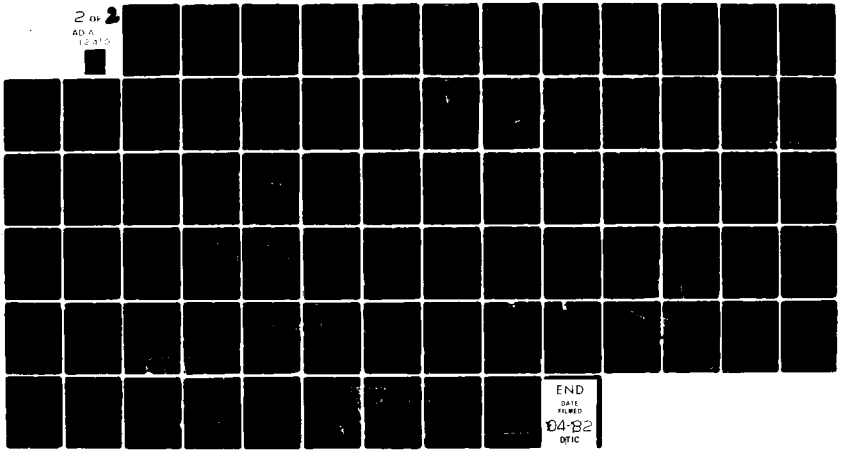

EXPLANATION
LAND STATUS MAP
MX SITING INVESTIGATION
4 - 1
FUGRO NATIONAL, INC.


R 63 E
R
DELAMAR
LAKE
DELAMAR



AD-A112 410 FUGRO NATIONAL INC LONG BEACH CA F/G 16/1
MX SITING INVESTIGATION. PROPOSED OPERATIONAL BASE SITE, COYOTE--ETC(U)
FEB 80 F04704-80-C-0006
UNCLASSIFIED FN-TR-35-1 NL

2 OF 2
AD A
112410



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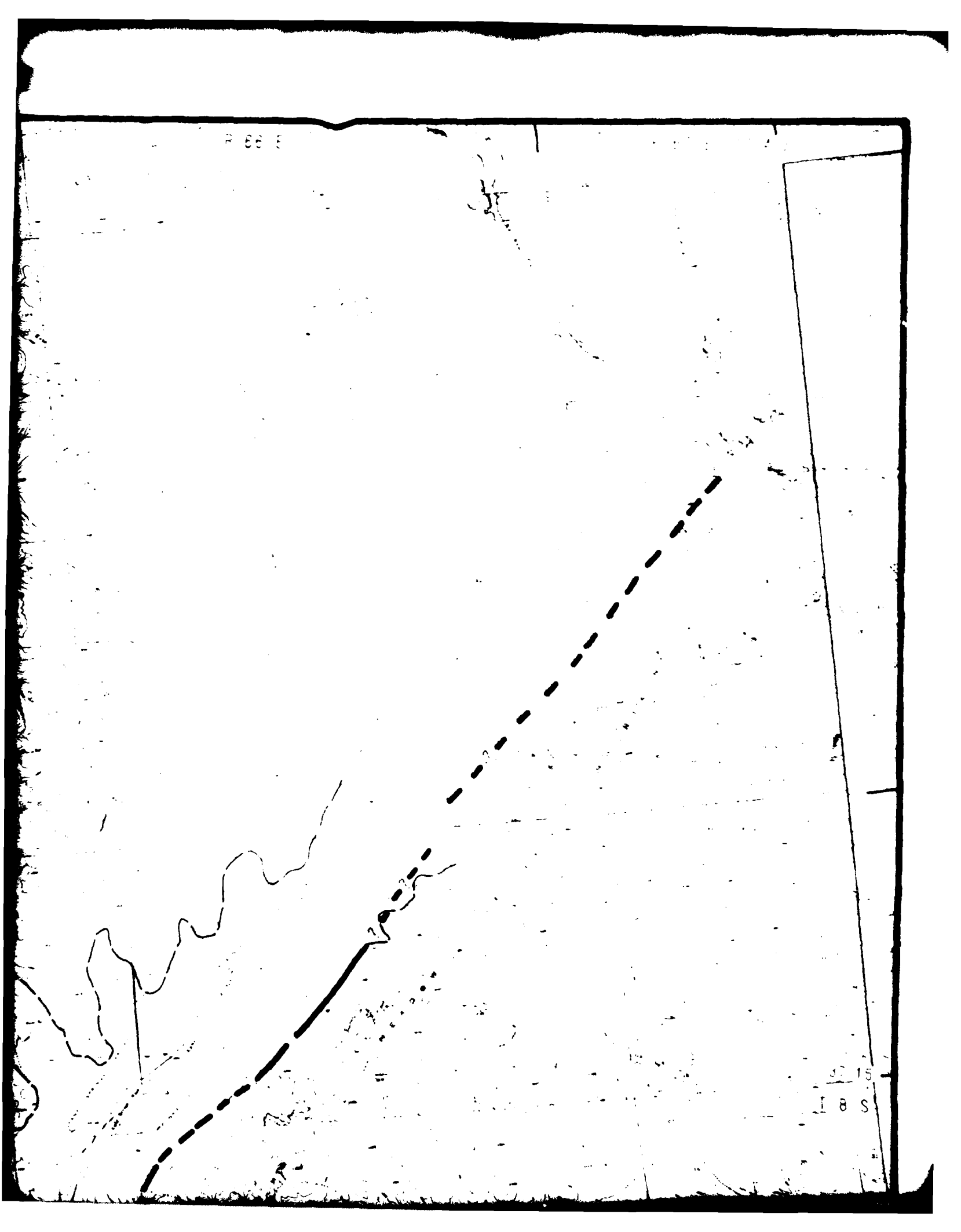
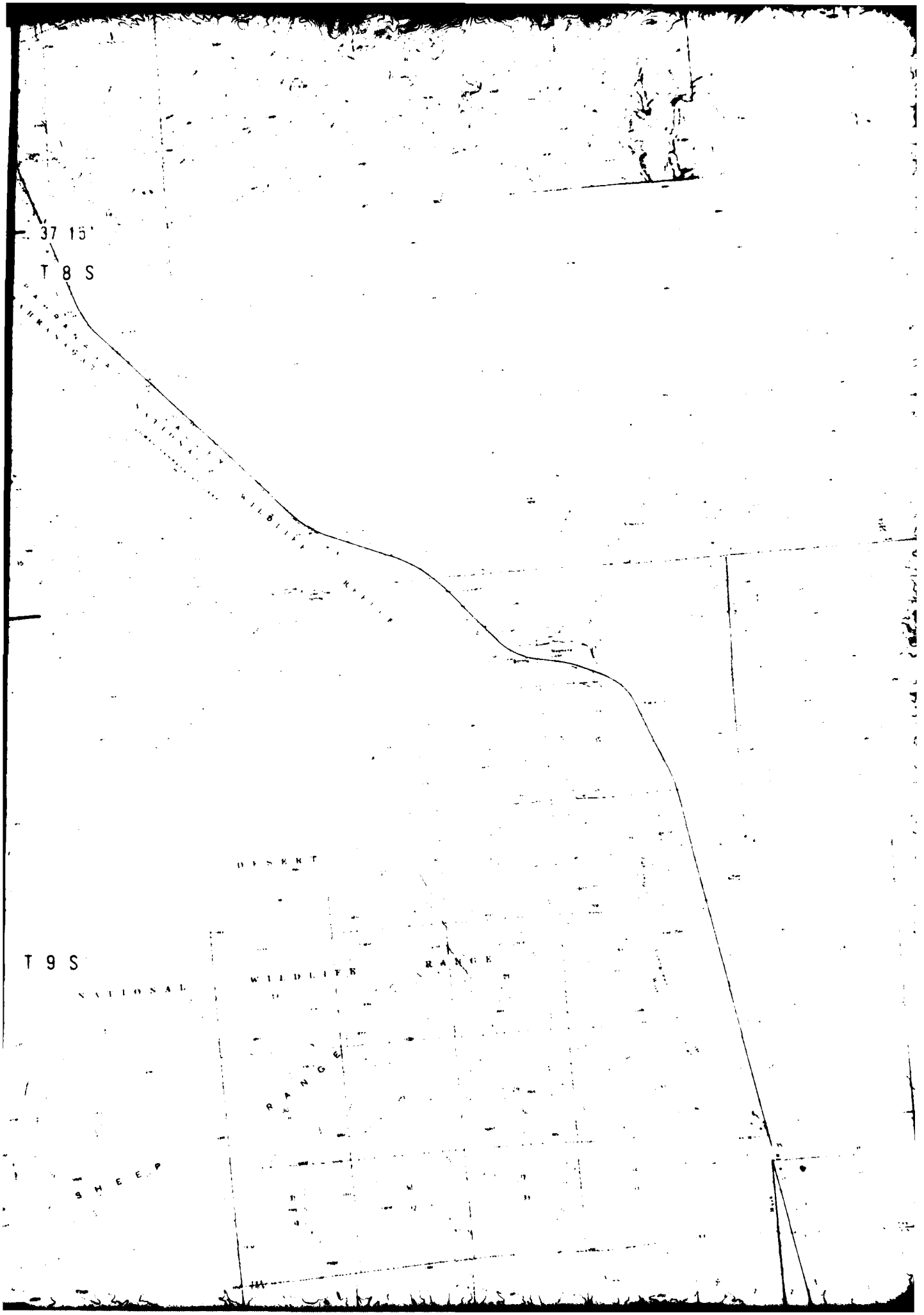
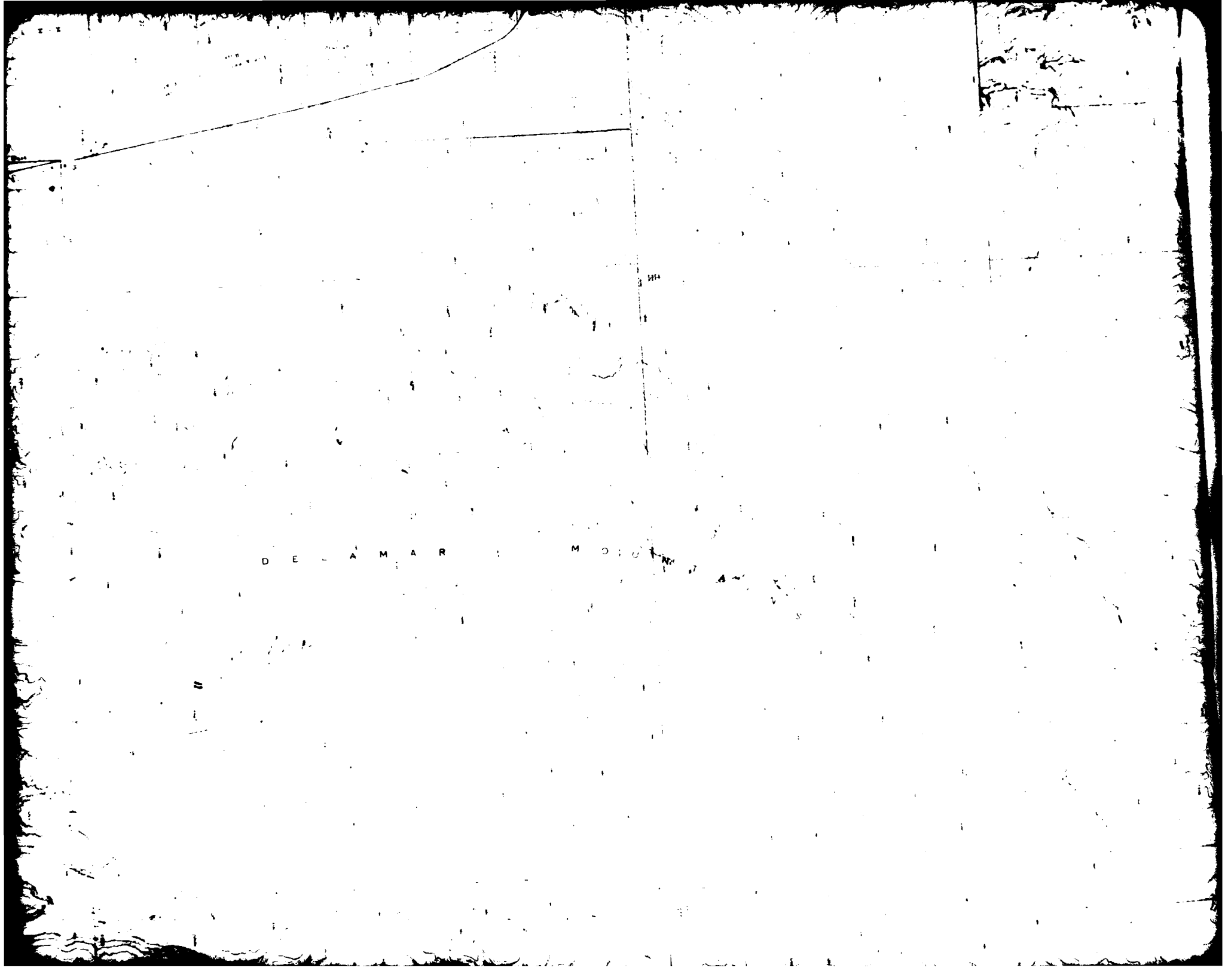
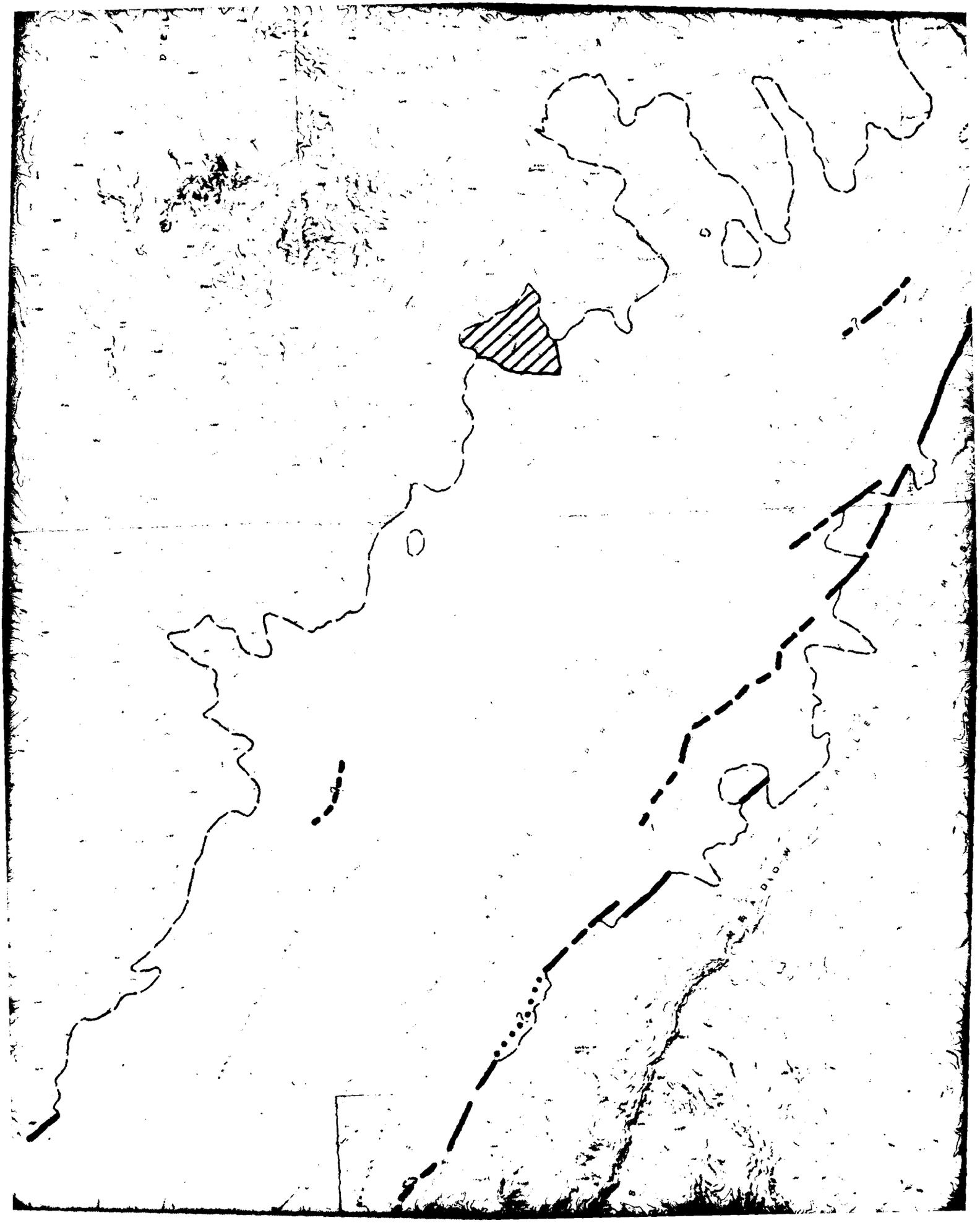
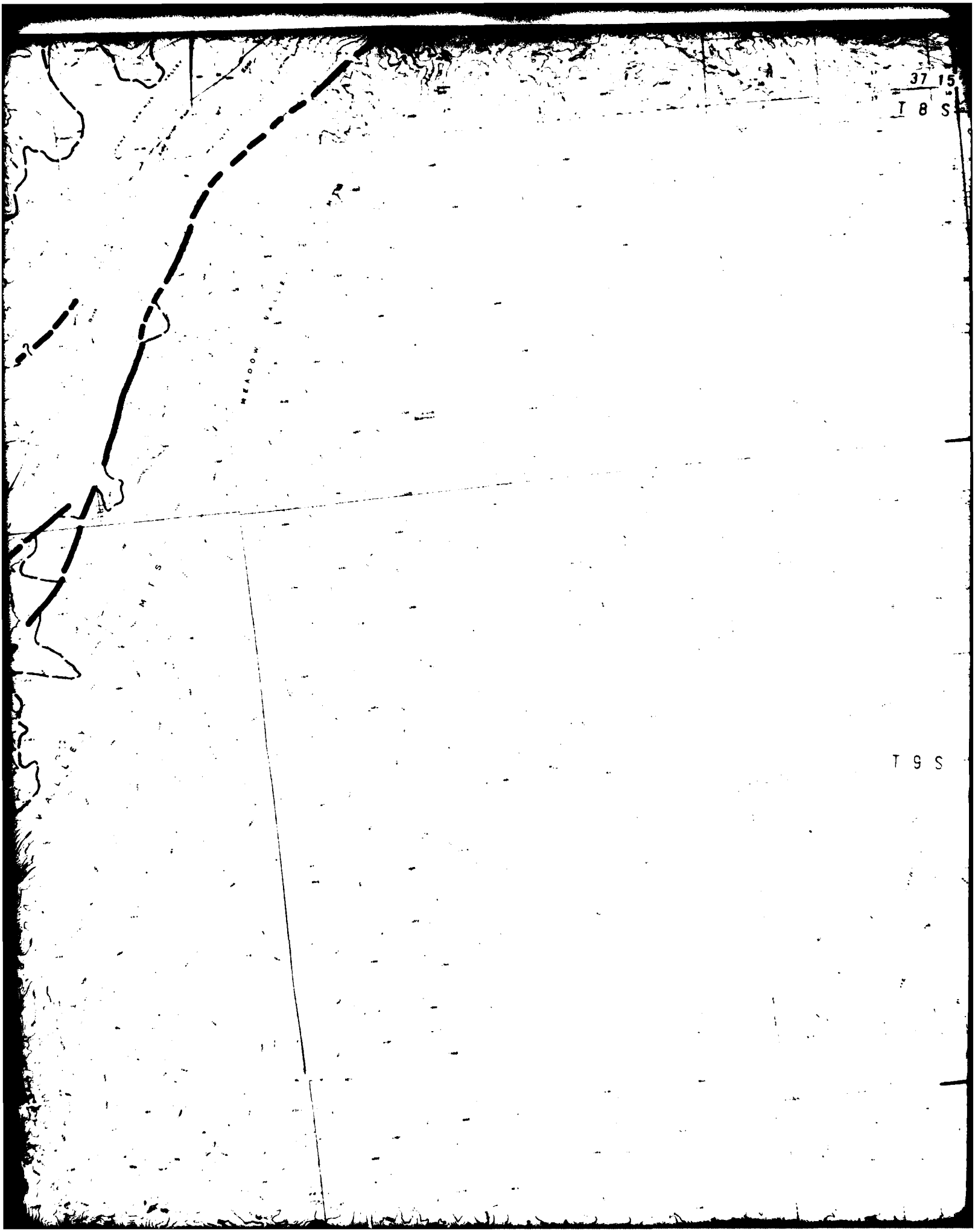


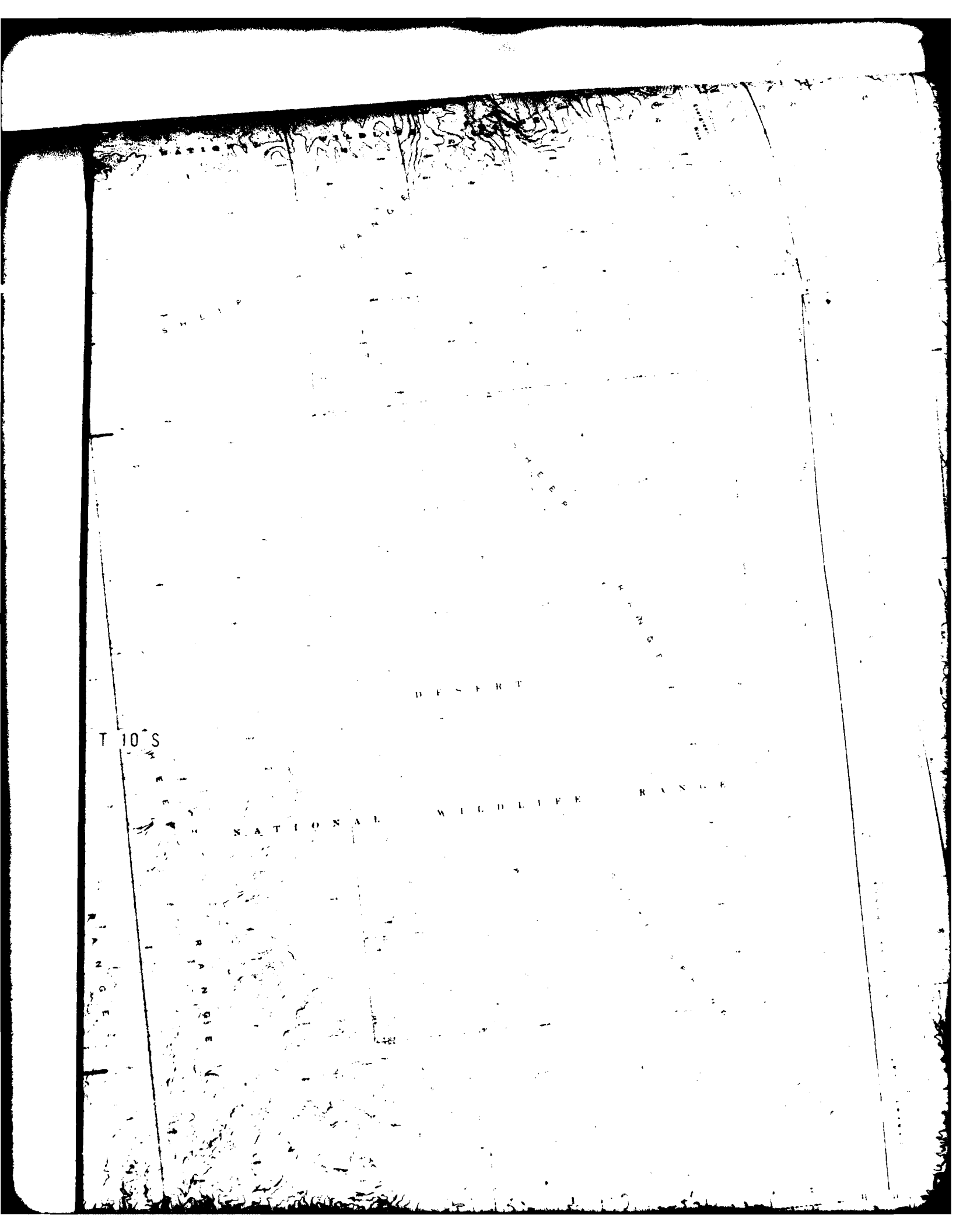

37 15'
T 8 S
T 9 S
DESERT
NATIONAL
WILDLIFE
RANGE
SHEEP

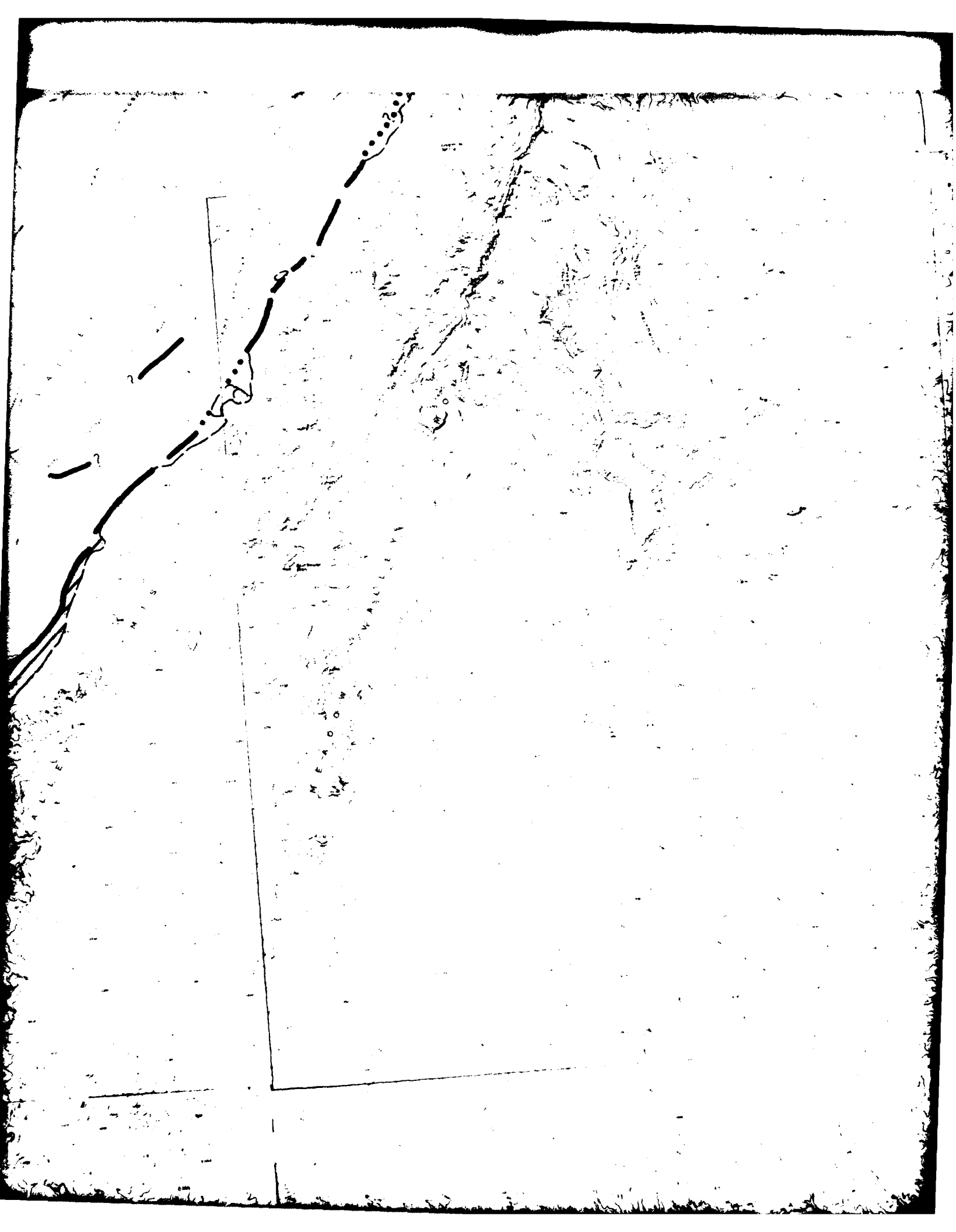

D E - A M A R

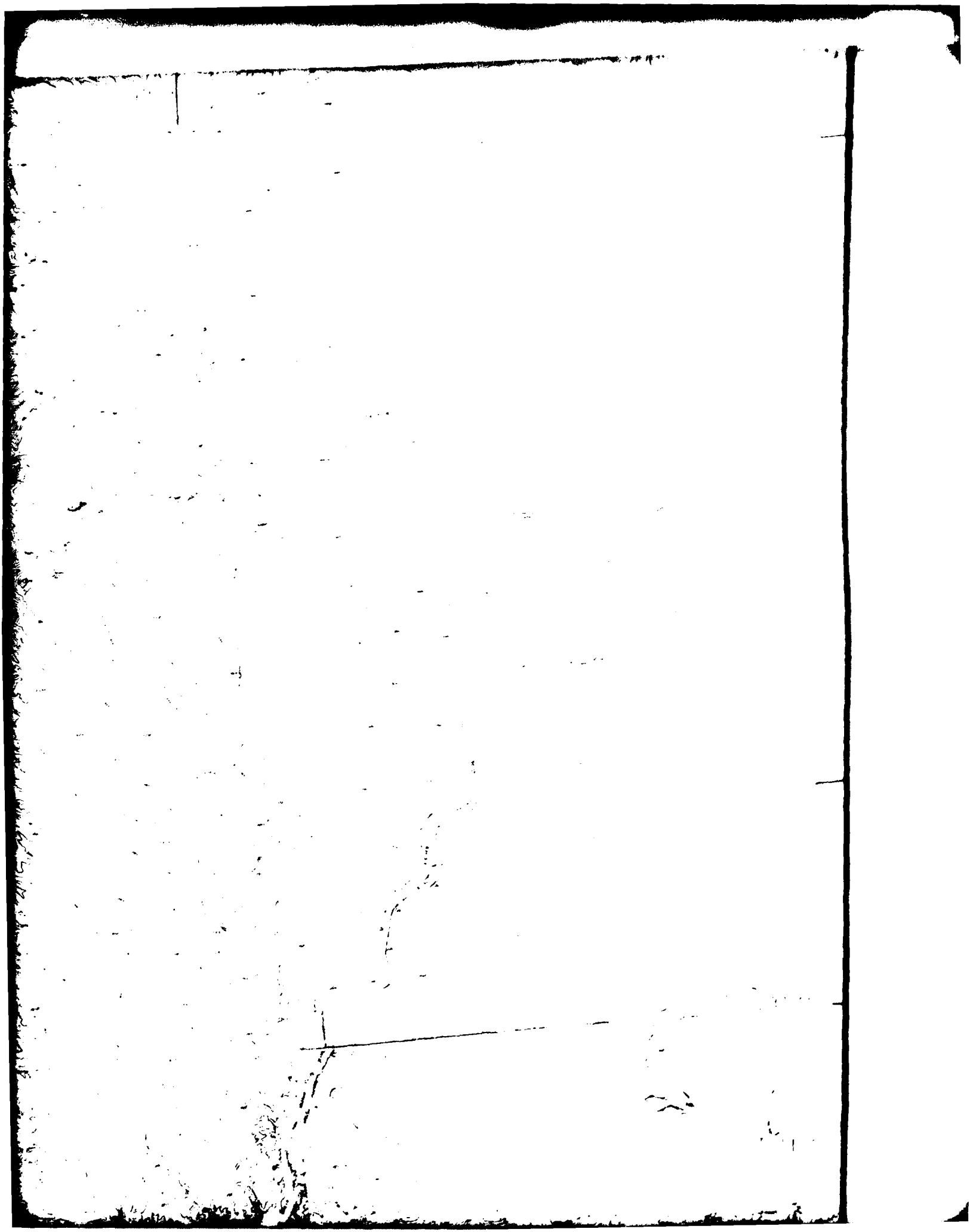
MOUNTAINS
BULGARIA

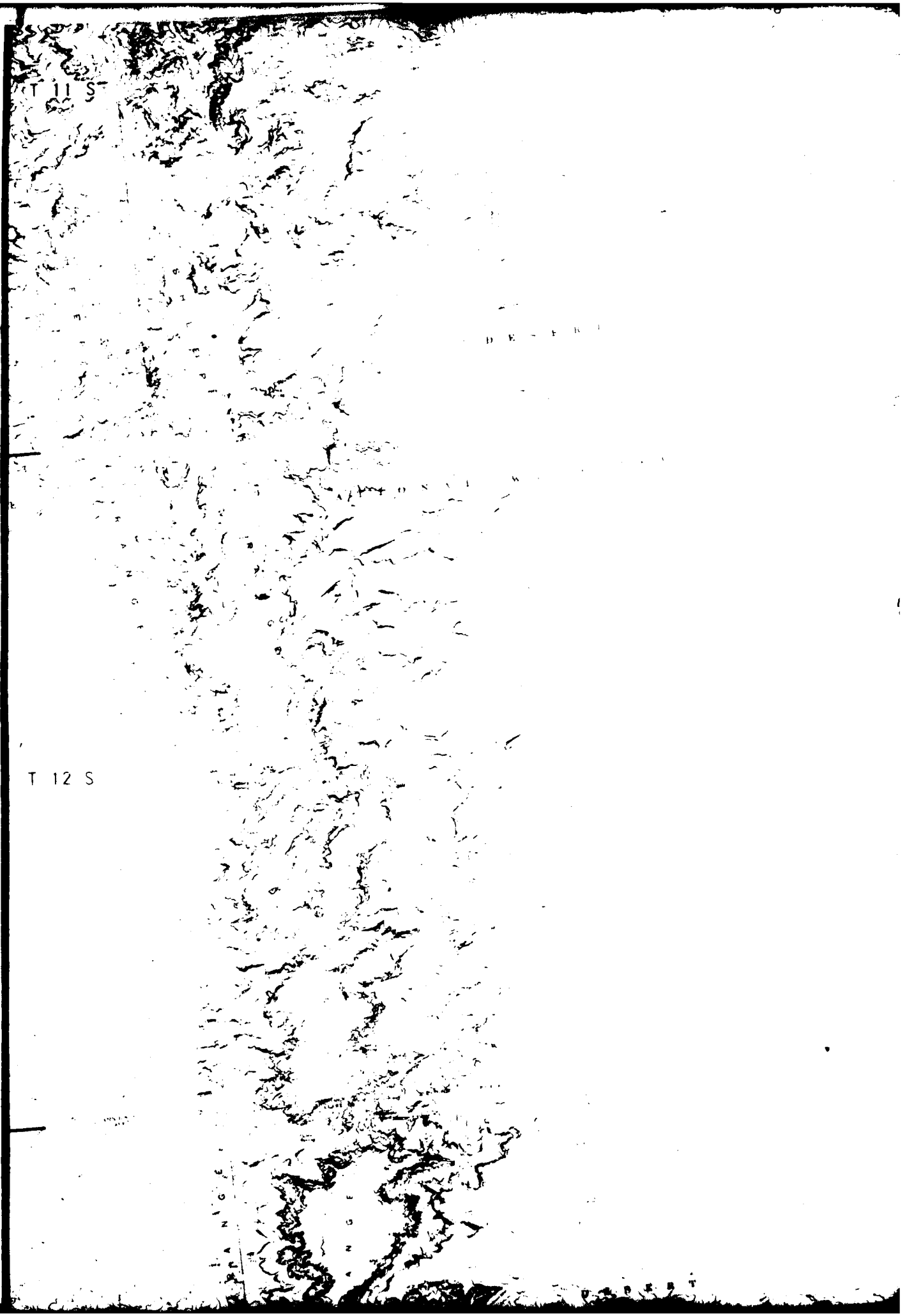


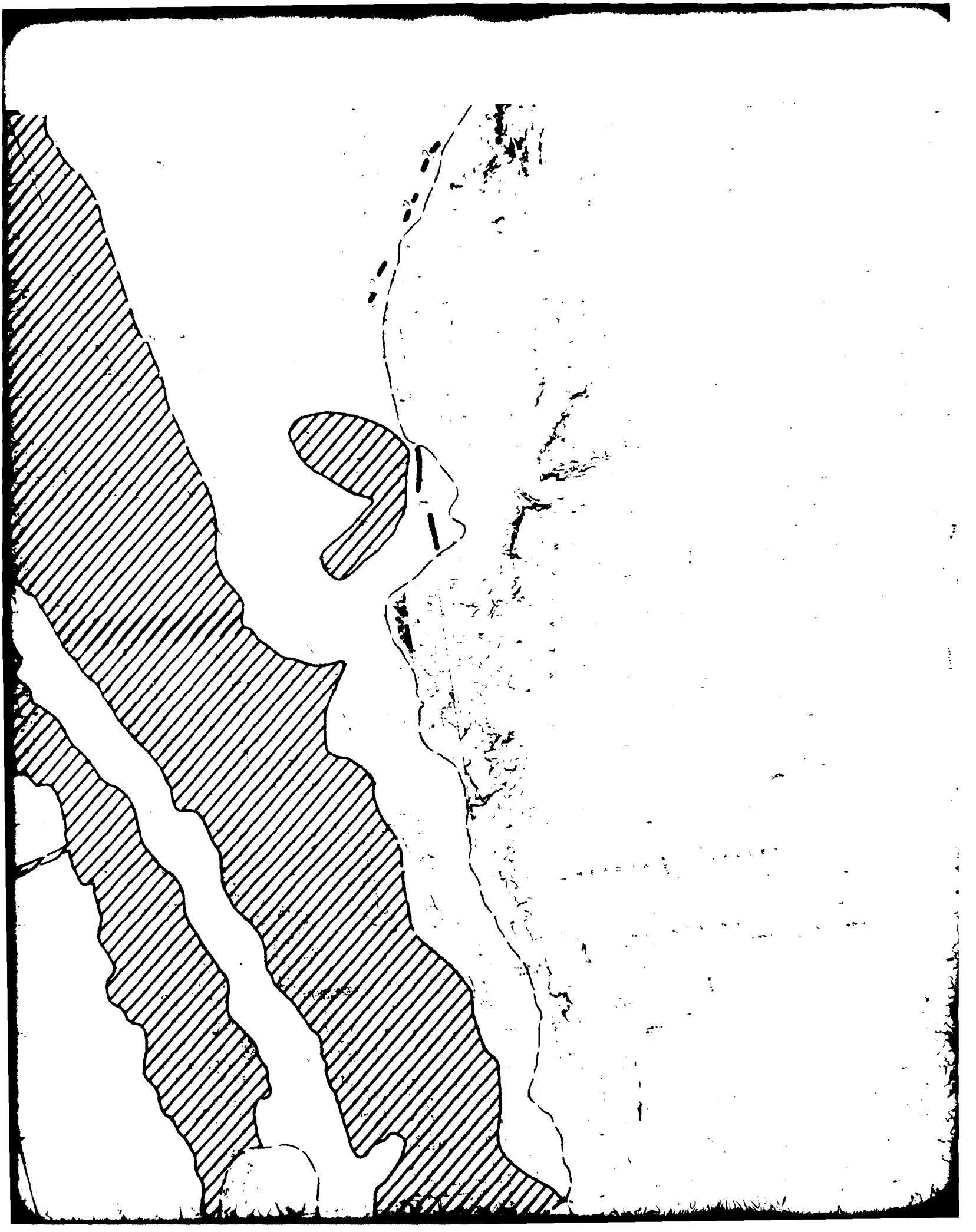

37 15
I 8 S
MEADOW
T 9 S

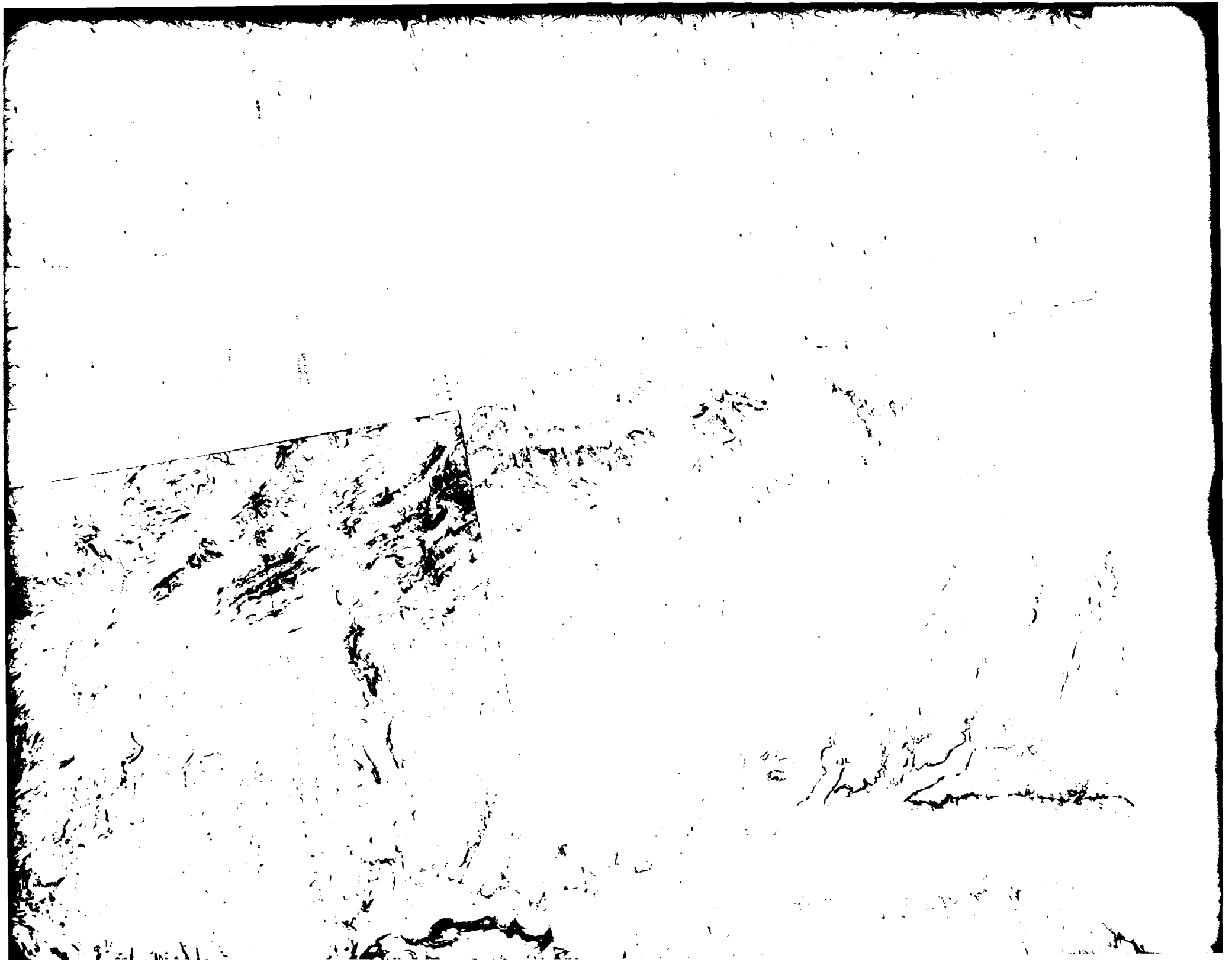

DESERT
T 10 S
NATIONAL
WILDLIFE
RANGE

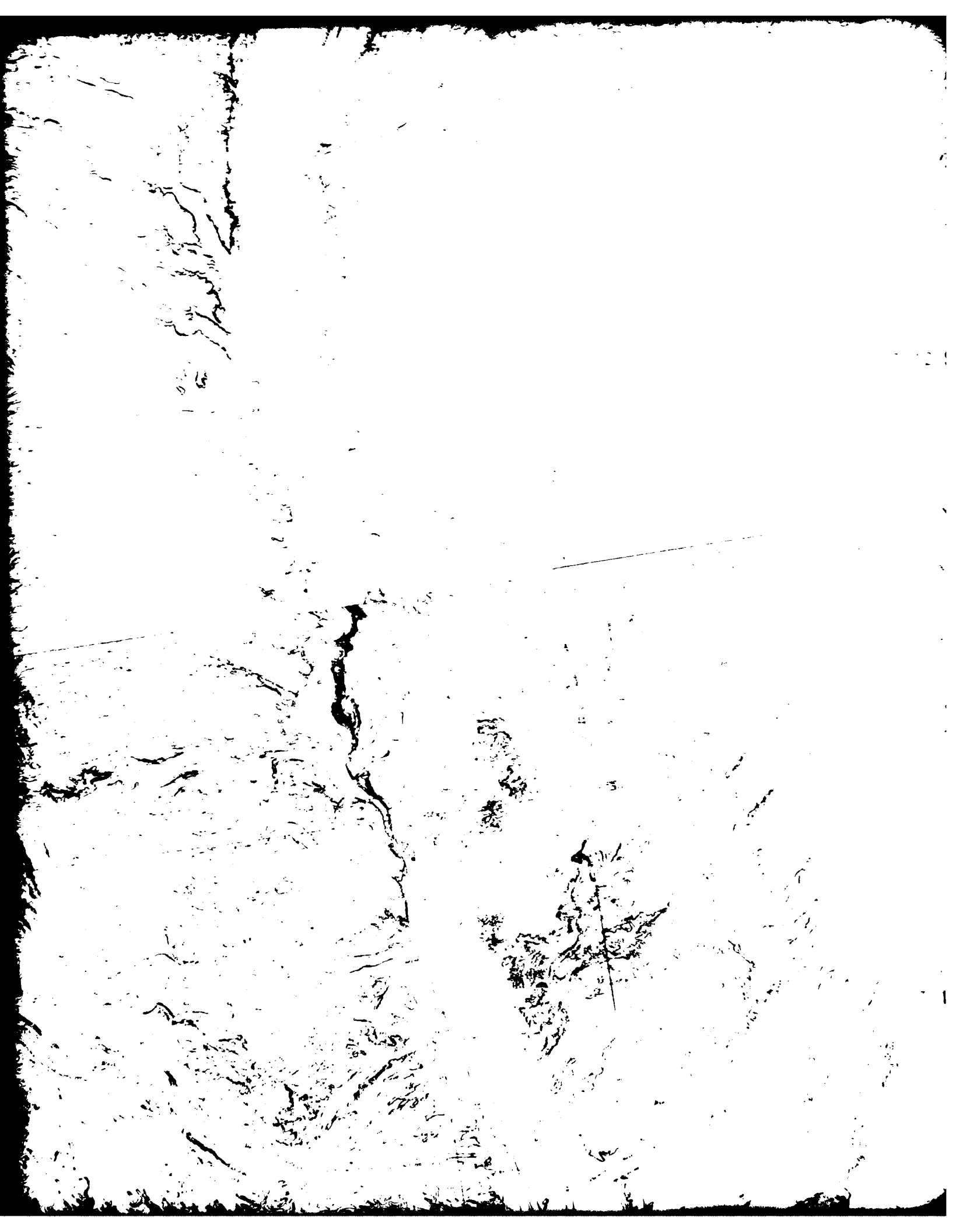


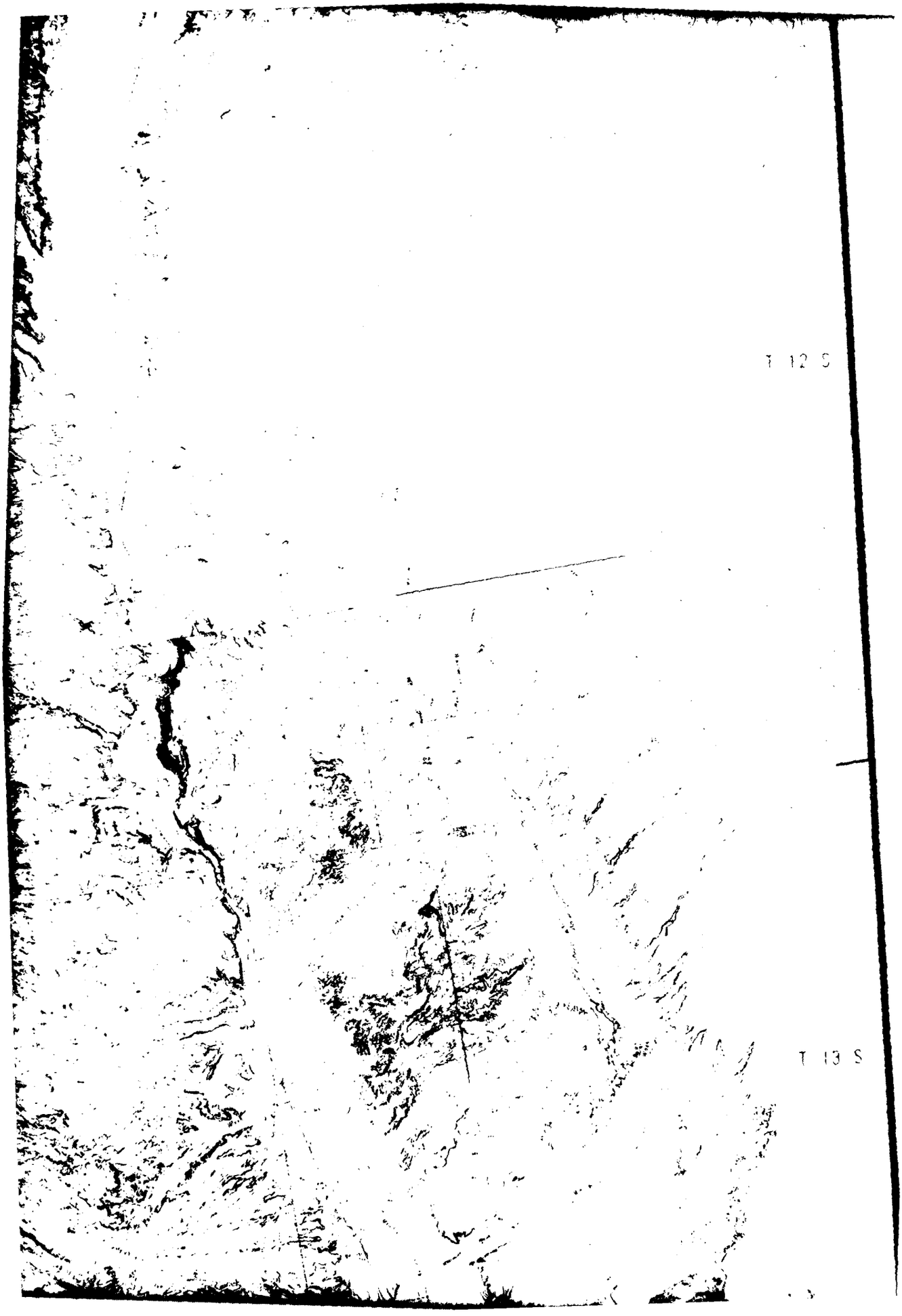


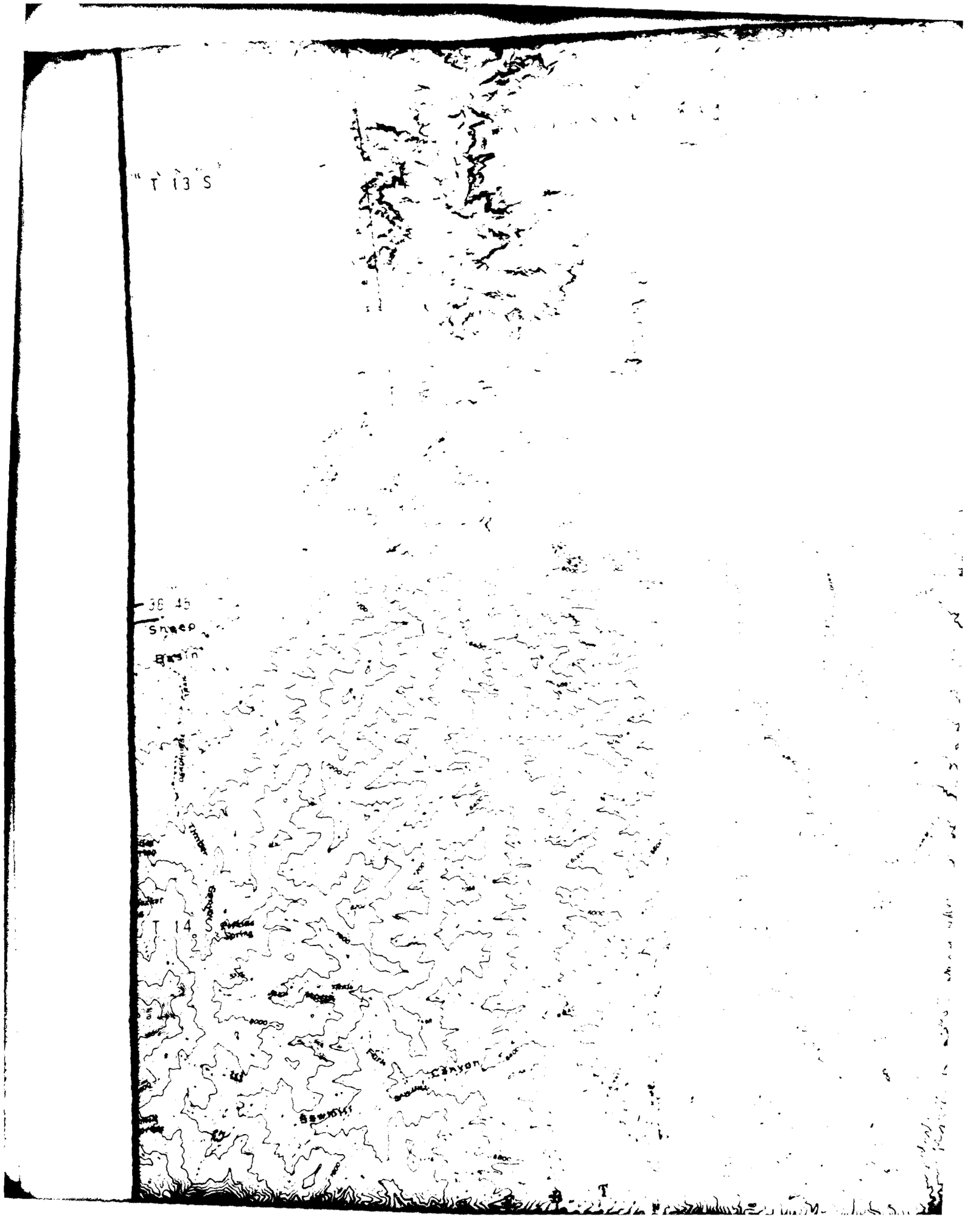

T 11 S
T 12 S







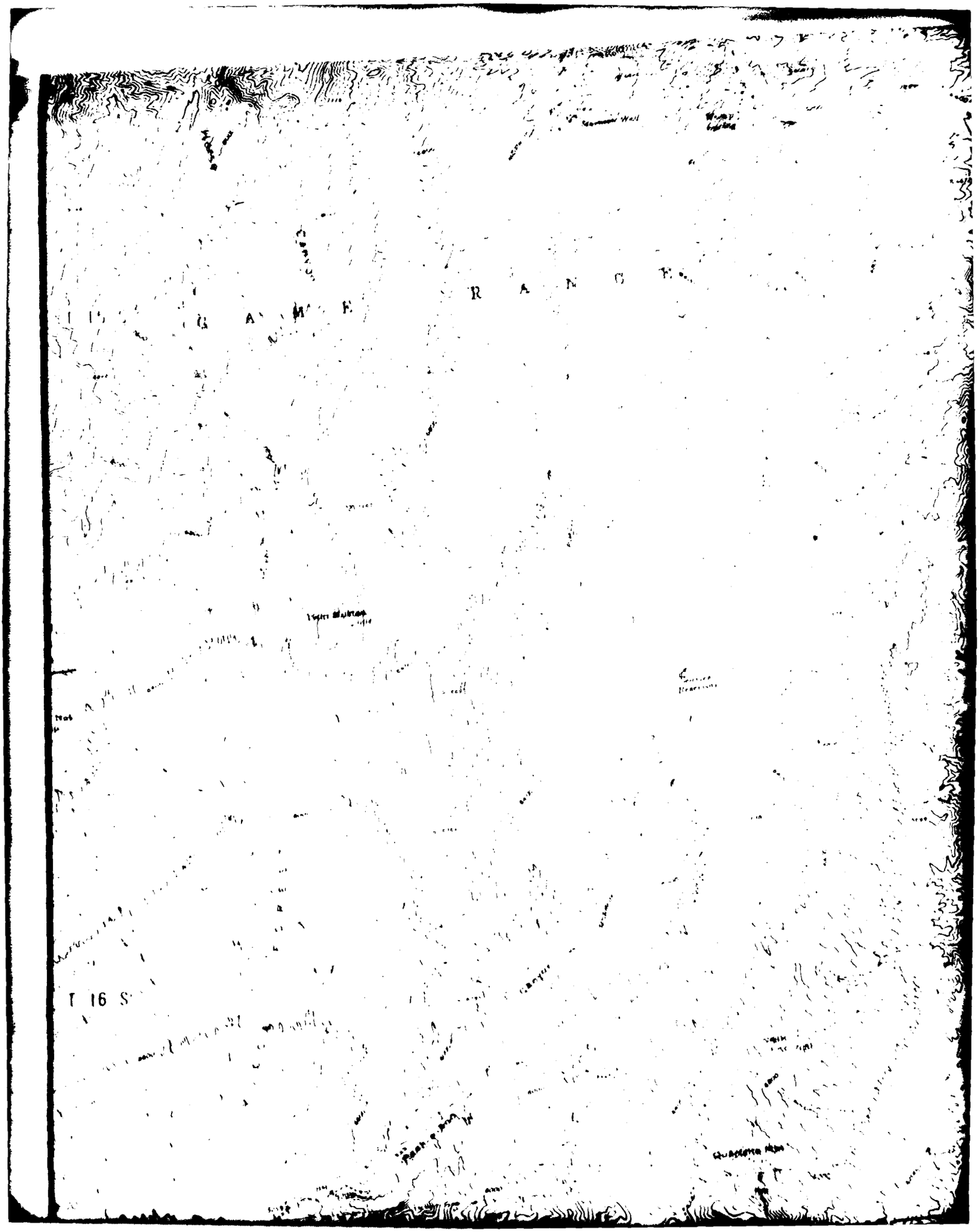

T 12 S
T 13 S

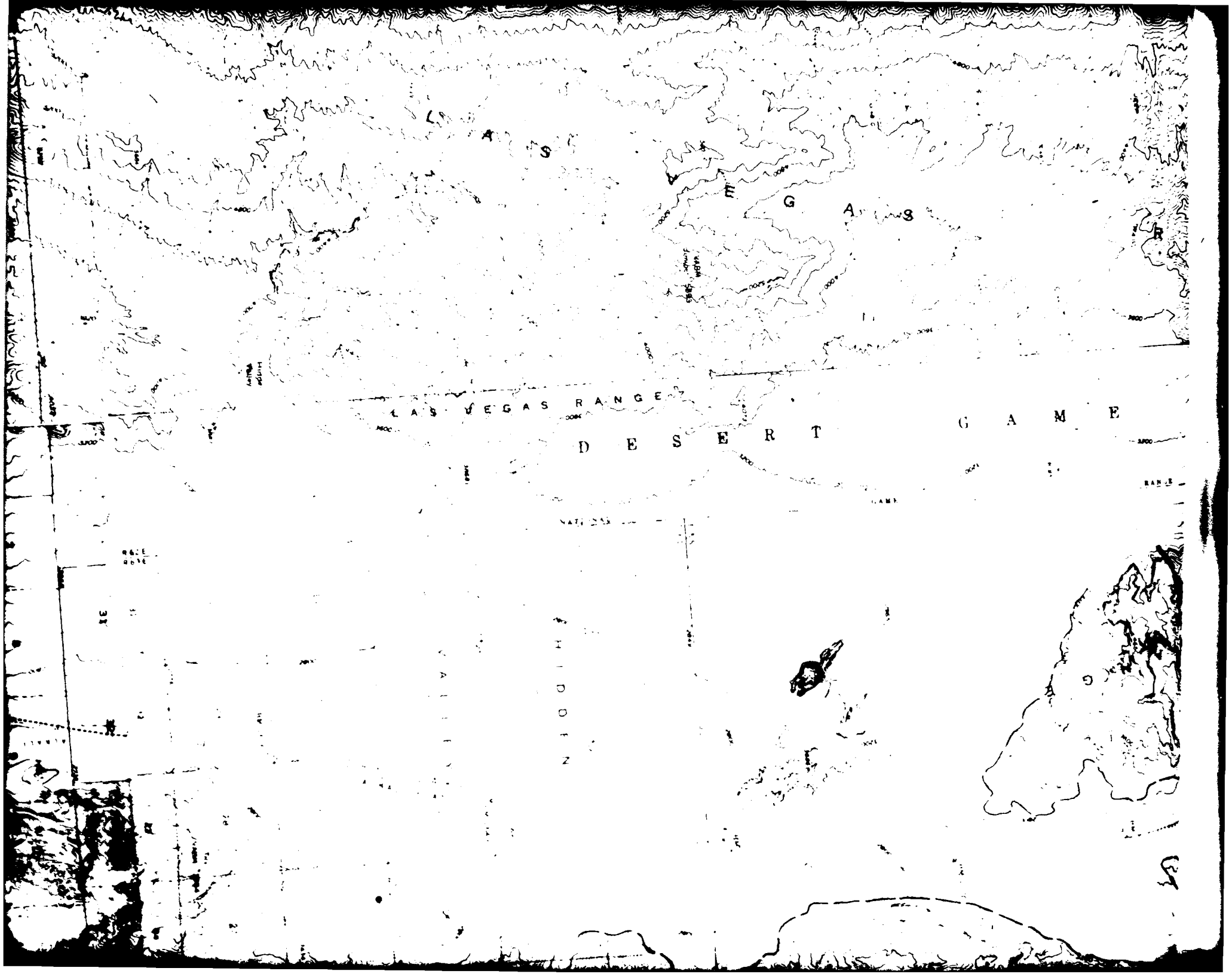

T 13 S
36 45
Sheep
Basin
T 14
Canyon

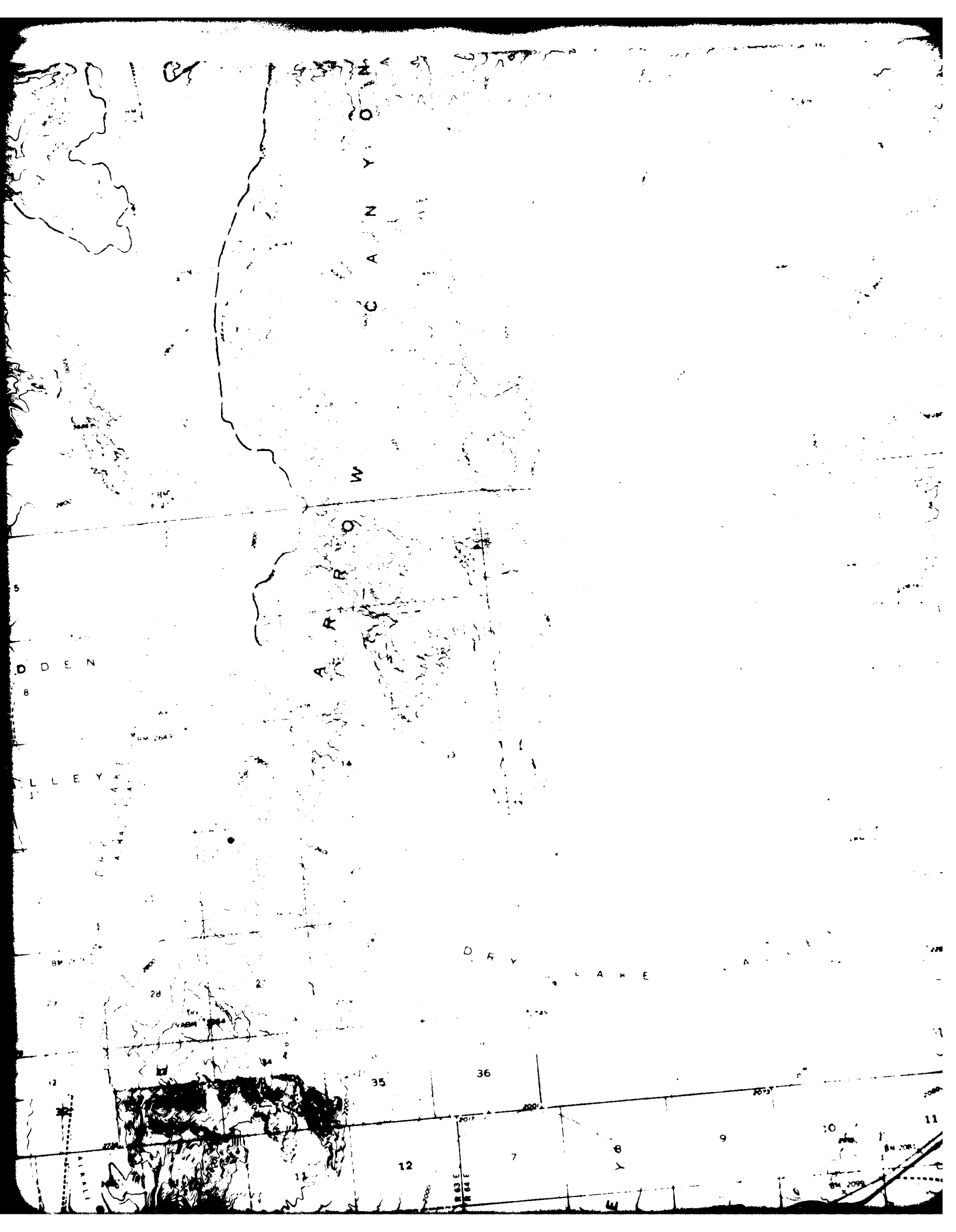
SAWMILL
Canyon
ELDOW
Canyon
ROAD
JEEP
TRAIL
RANGE
BOUNDARY


Wash
BM 1832
BM 1845
Well
Muddy Spring
Home Ranch
Warm Springs
Battleship
Muddy
M O A P A
White Narrows
RIVER
River
INDIAN
RESERVATION
BM 1808
BM 1764
UNION
PACIFIC
Moapa
Valley
Pumping Sta
V A L L E Y
Searles Ranch
Hogan Spring
BM 1705
BM 1740
Wash


36 45
T 14 S
T 15 S
Moapa
Searles Ranch
Pumping Plant
BM 1808
BM 1764
BM 1740
BM 1705
BM 1600
BM 1709
BM 1714
Hogan Spring
Wash
RIVER
INDIAN
RESERVATION
West Point Cemetery
Valley
Union


R A N G E
T 16 S


LAS VEGAS RANGE
DESERT GAME


CANYON
ARROW
DRY LAKE
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36
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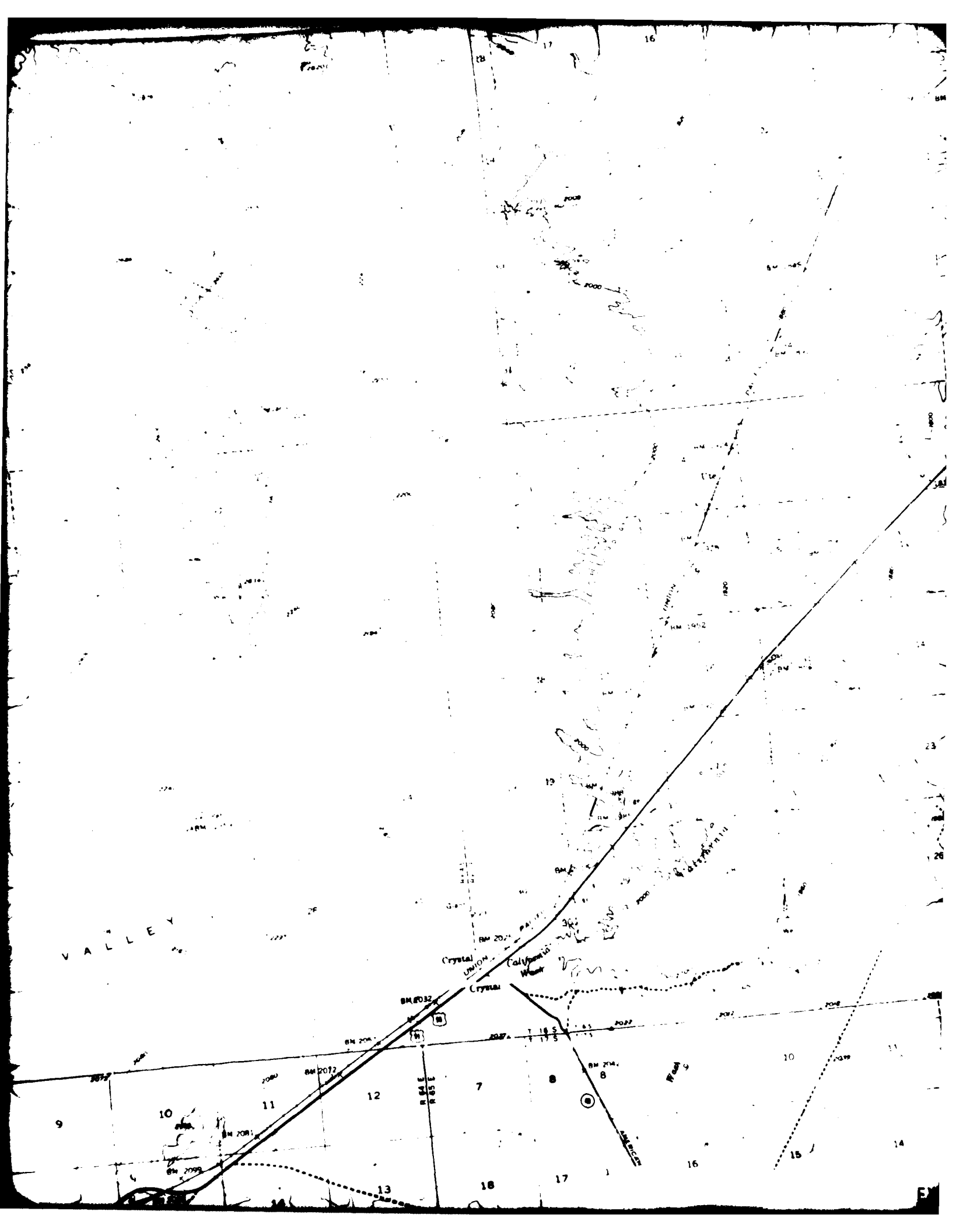
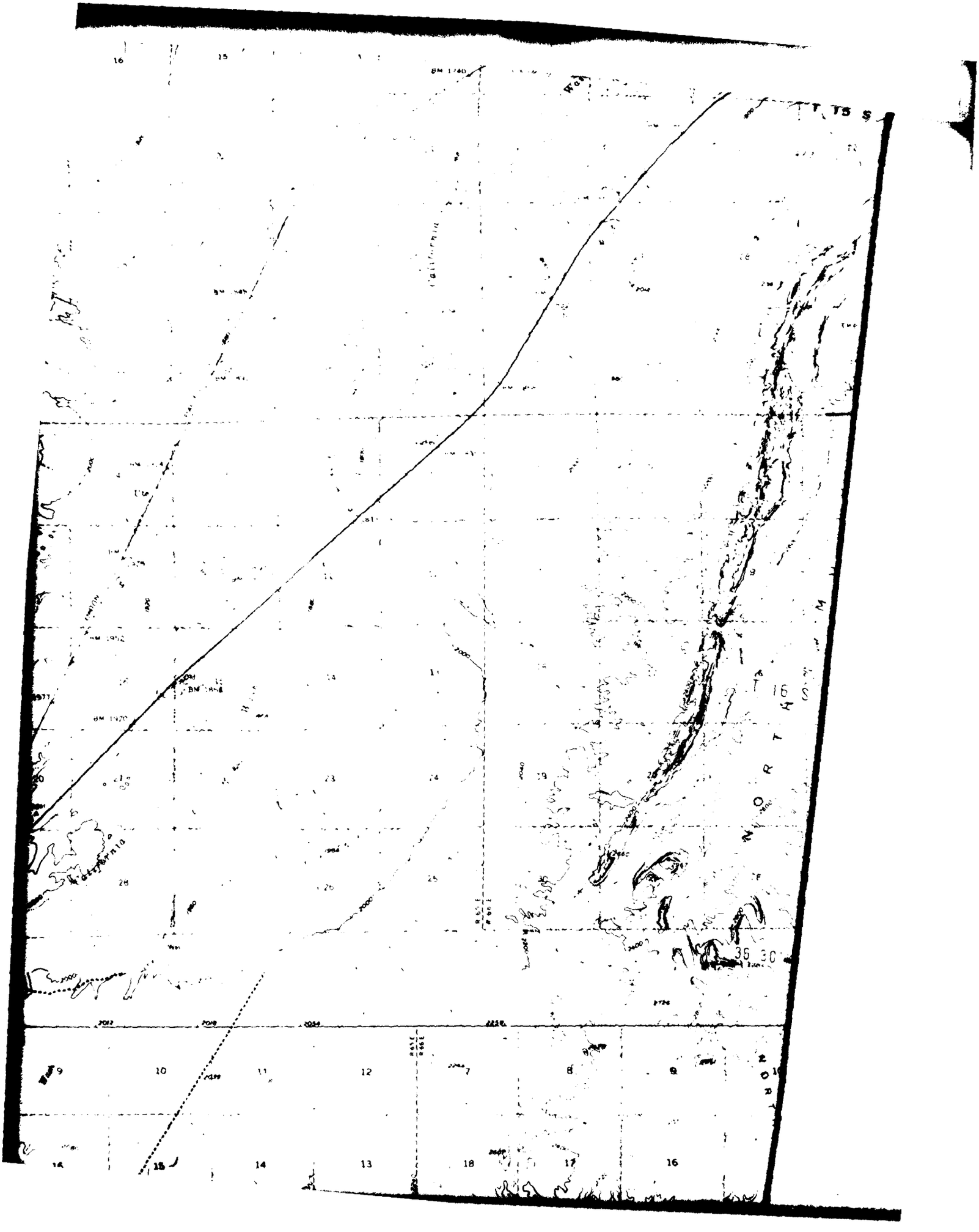

VALLEY
Crystal
Union
California
Crystal
BM 2032
BM 2072
BM 2091
BM 2099
AMERICAN


T 15 S
T 16 S
NORTH
MOUNTAIN
35 30
BM 1740
BM 1970
BM 1912
R 5 E
R 6 E


T 16 S
T 17 S
36 30
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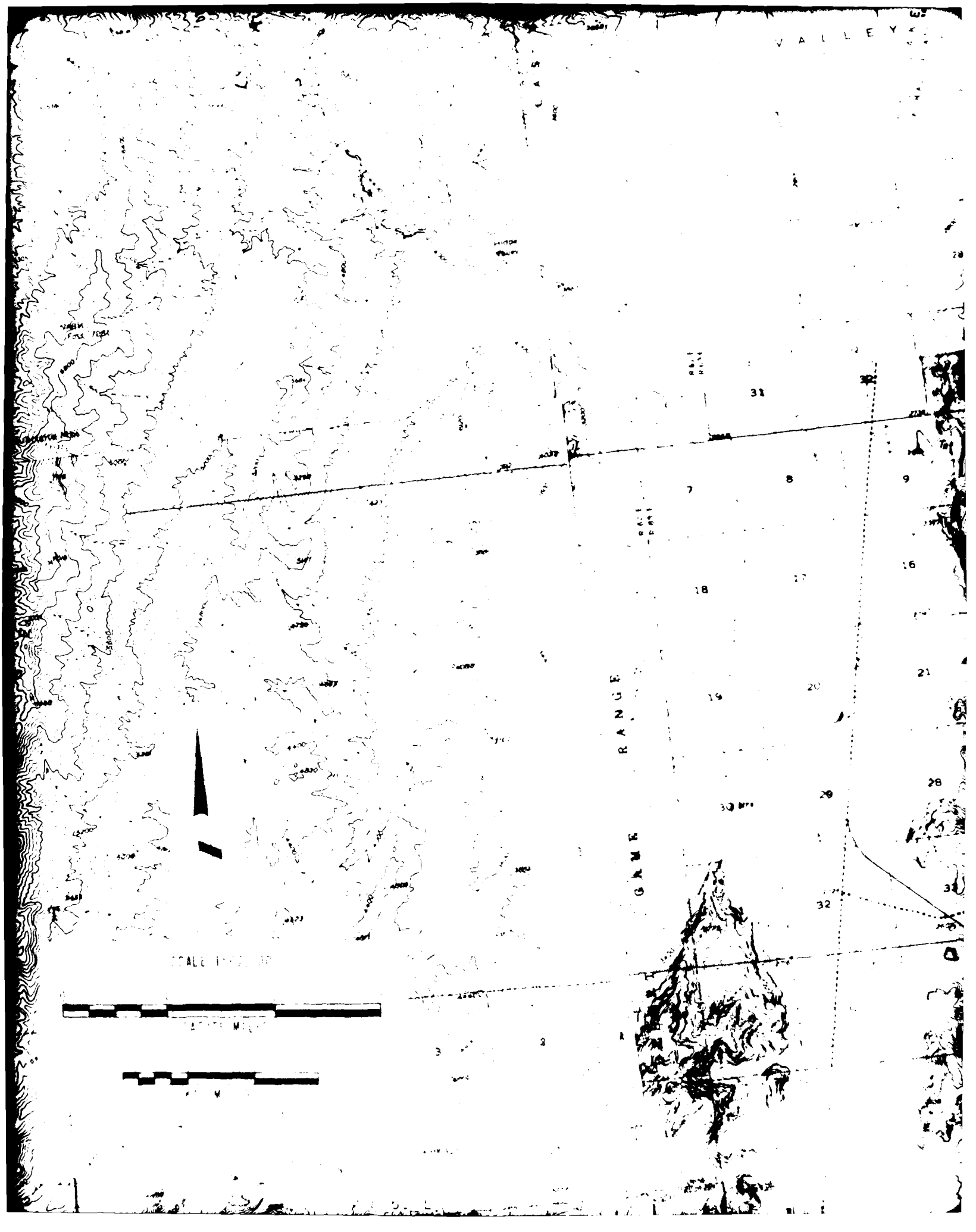
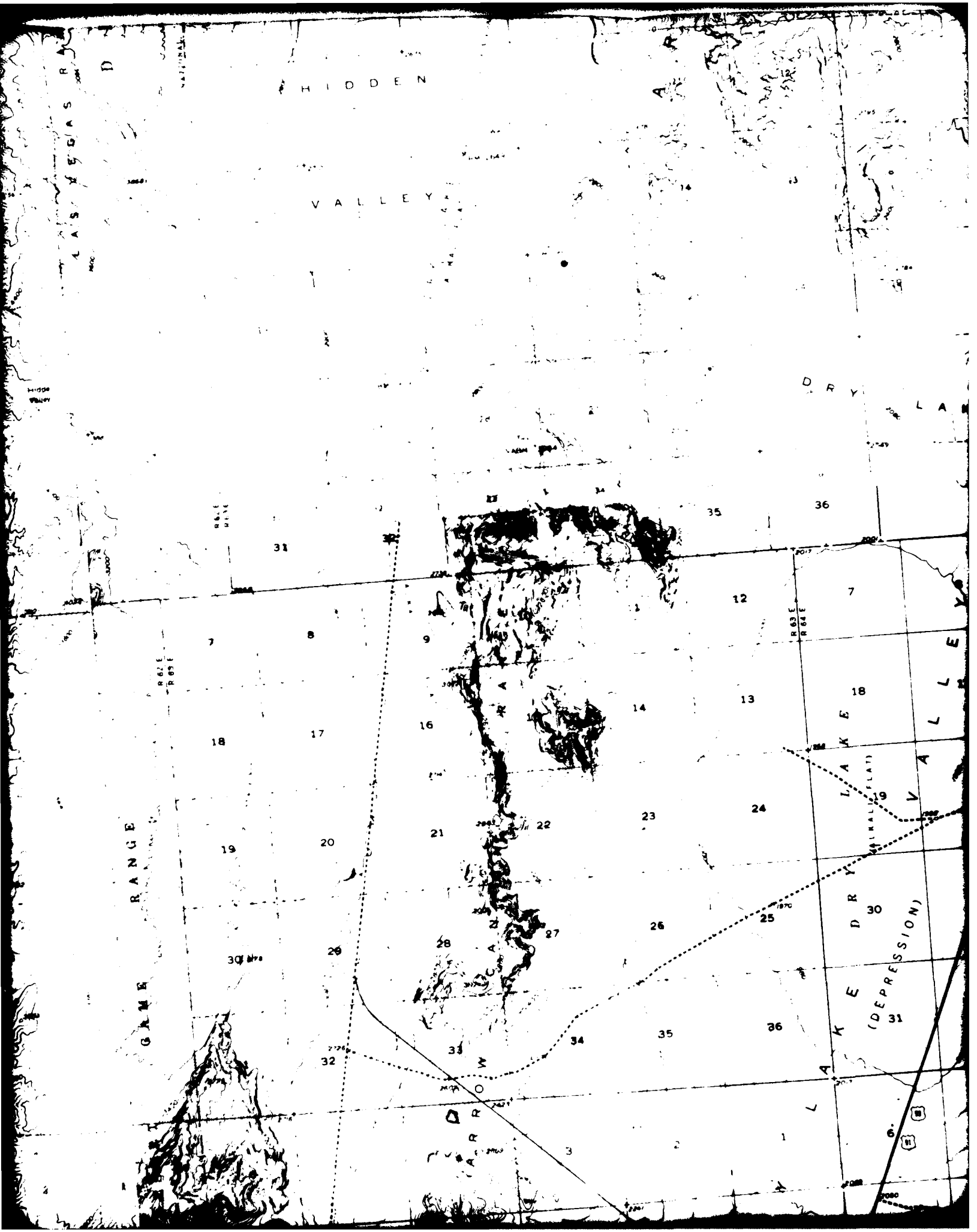
FOREST
RANGE
DESERT
Canyon
Quadalupe Mtn


VALLEY
RANGE
GAME


HIDDEN
VALLEY
DRY LAKE
GAME RANGE
LAKE VALLEY
DRY LAKE (DEPRESSION)
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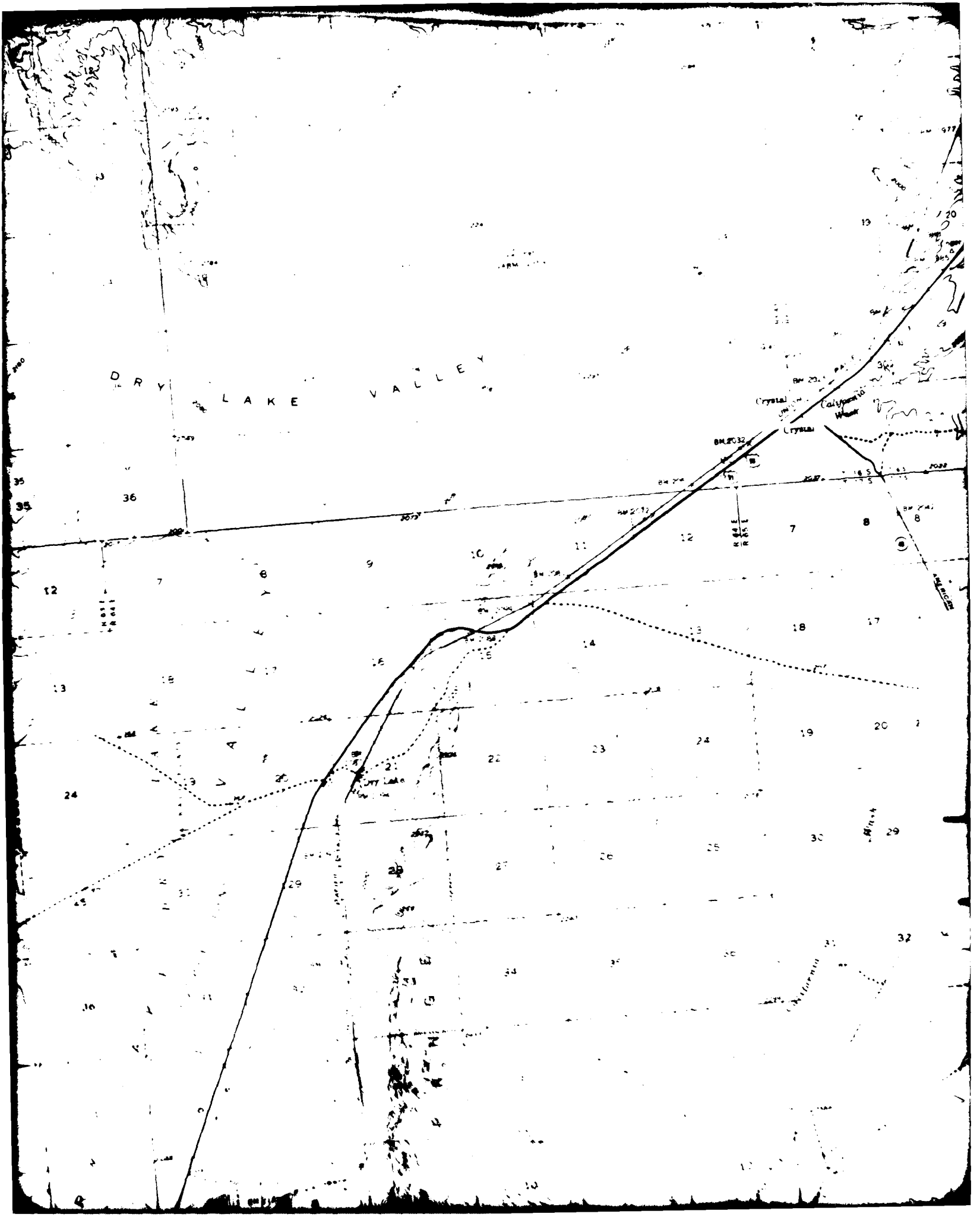
DRY LAKE VALLEY
Crystal
California
Crystal
BM 2032
BM 2032
Dry Lake
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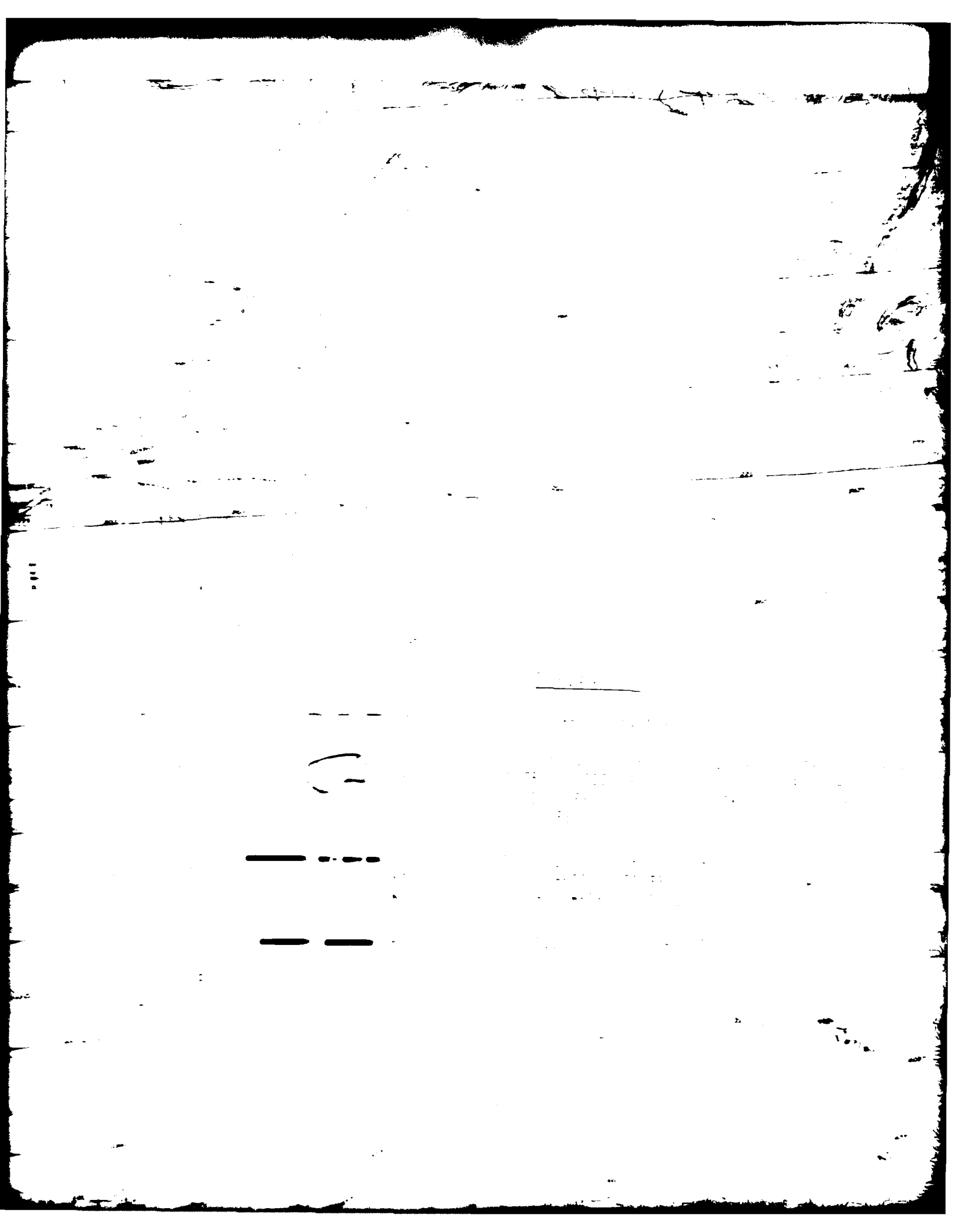


EXPLANATION

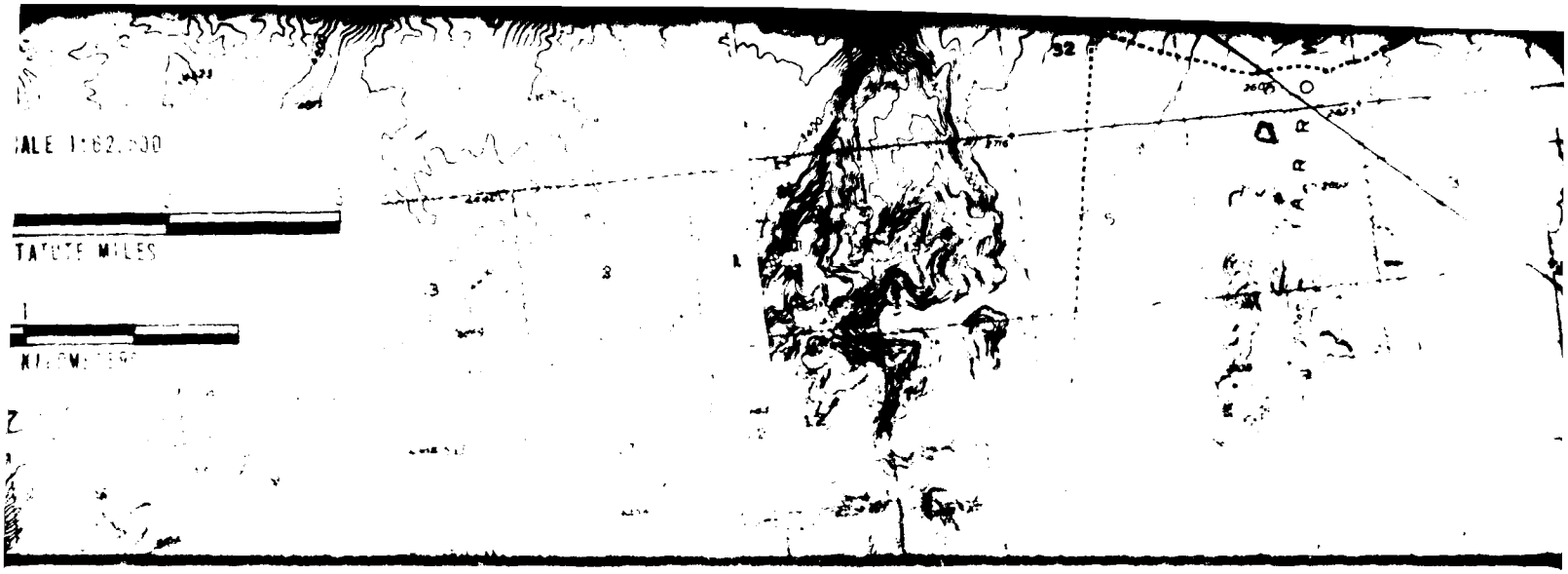
— — — APPROXIMATE ROCK NON-ROCK BOUNDARY

ADVERSE TERRAIN, INCLUDING AREAS EXCEEDING 10 GRADE OR MORE THAN HALF OF SLOPES EXCEEDING 10 GRADE, AND AREAS HAVING DRAINAGE DENSITIES AVERAGING AT LEAST TWO 10 FOOT (3meter) DRAINAGES PER 1000 FEET

FAULT DELINEATED ON GEOLOGIC MAP OF THE EASTERN GREAT BASIN MODIFIED BY AERIAL PHOTO INTERPRETATION. SOLID WHERE WELL EXPOSED, DASHED WHERE INFERRED

—?— PHOTOLINEATION, POSSIBLY FAULT-RELATED

FEB 80


ALE 1:62,000
TATUTE MILES
KILOMETERS
Z


LAKE
DRY
MOUNTAIN
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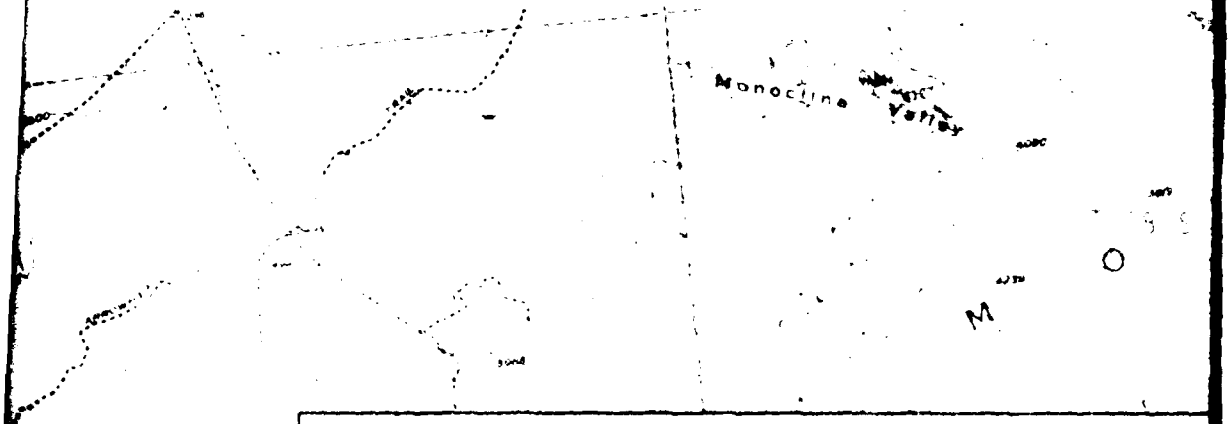
California

PHOTO LINEATION, POSSIBLY FAULT-RELATED



TERRAIN AND FAULT [illegible]

[illegible] SPRING, [illegible] SPRINGS VALLEY, [illegible]

UGRO MATIONAL, INC.

R 62 E

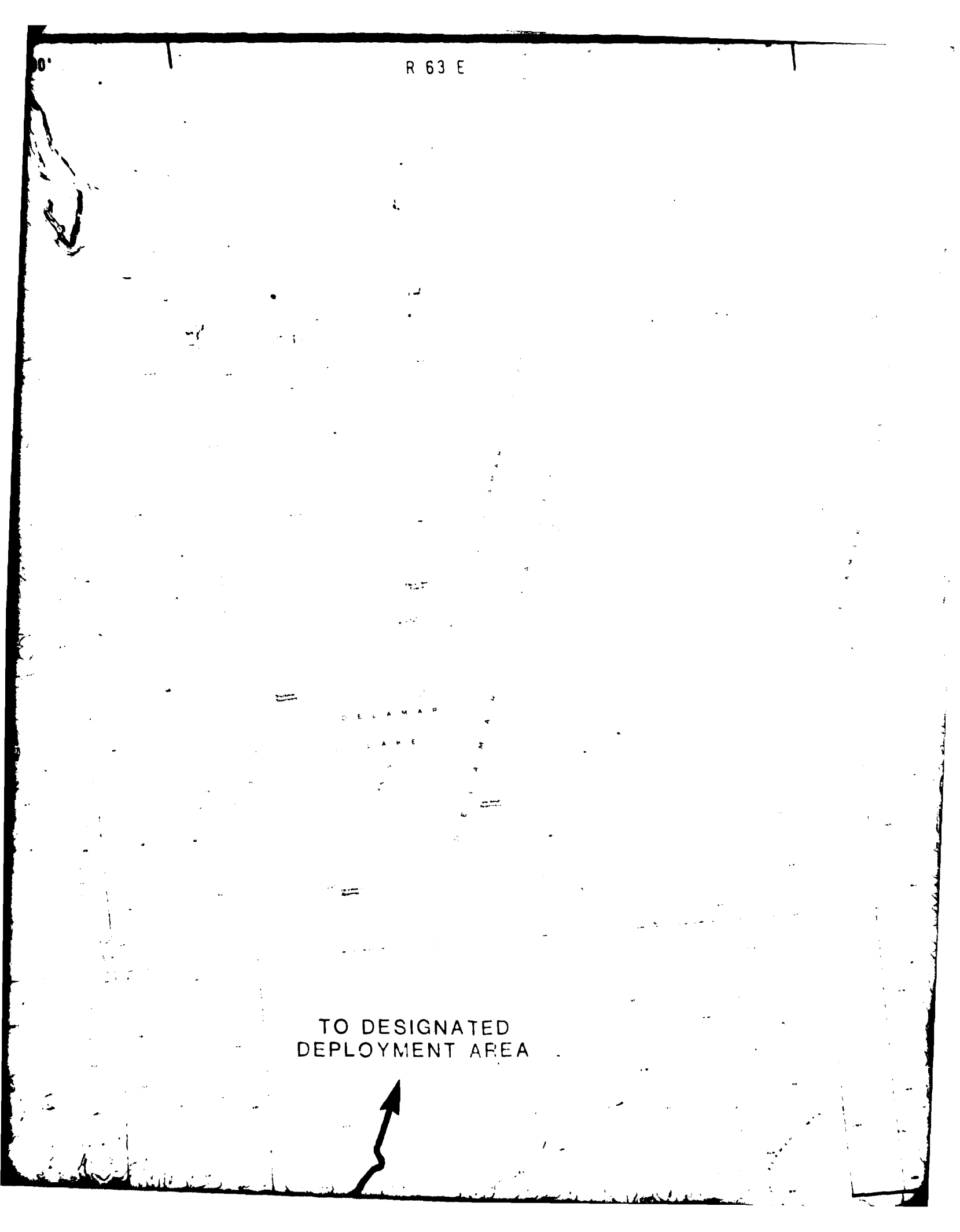
115 00'

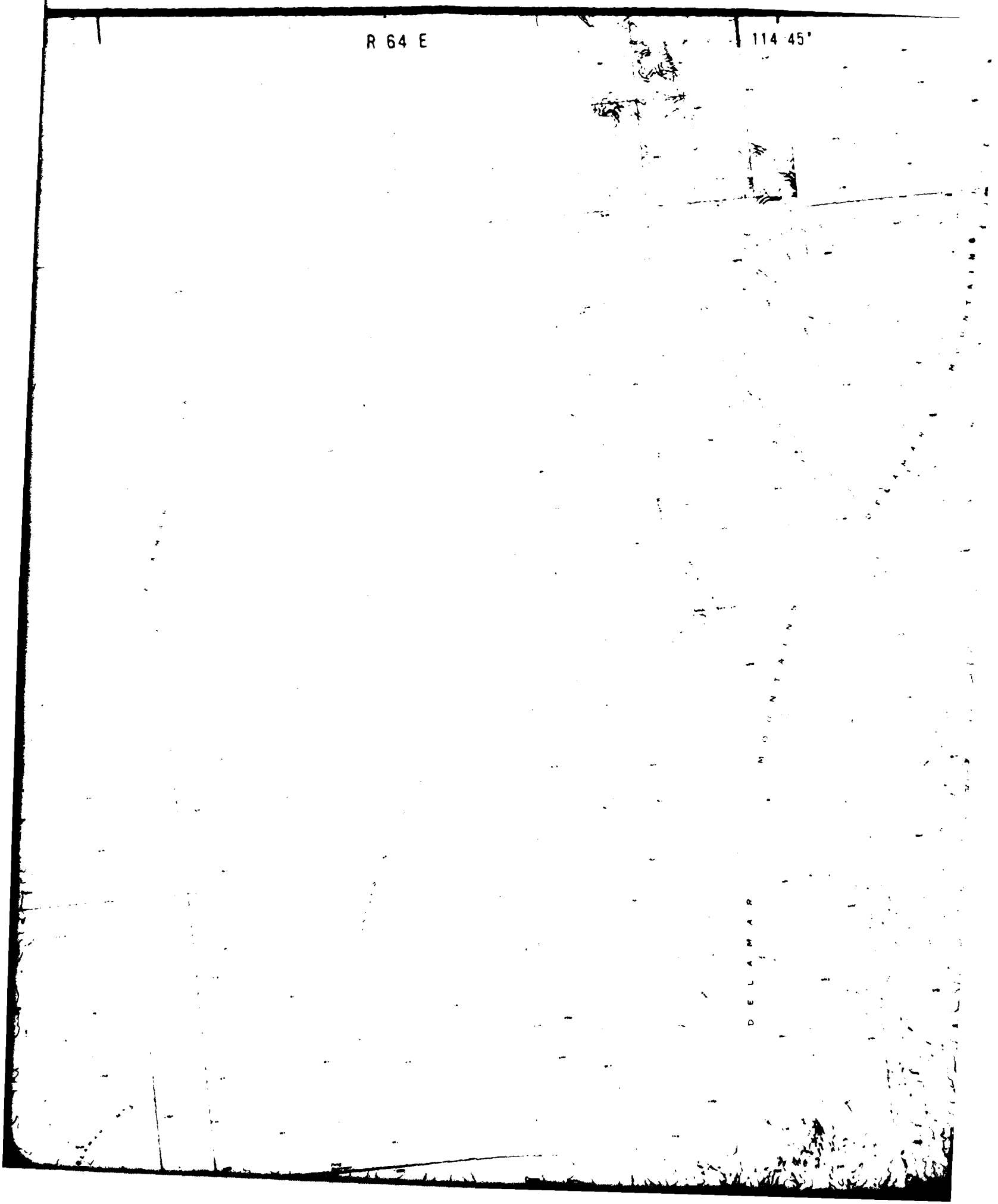
T 6 S

T 7 S

TO
DEPL

R 63 E

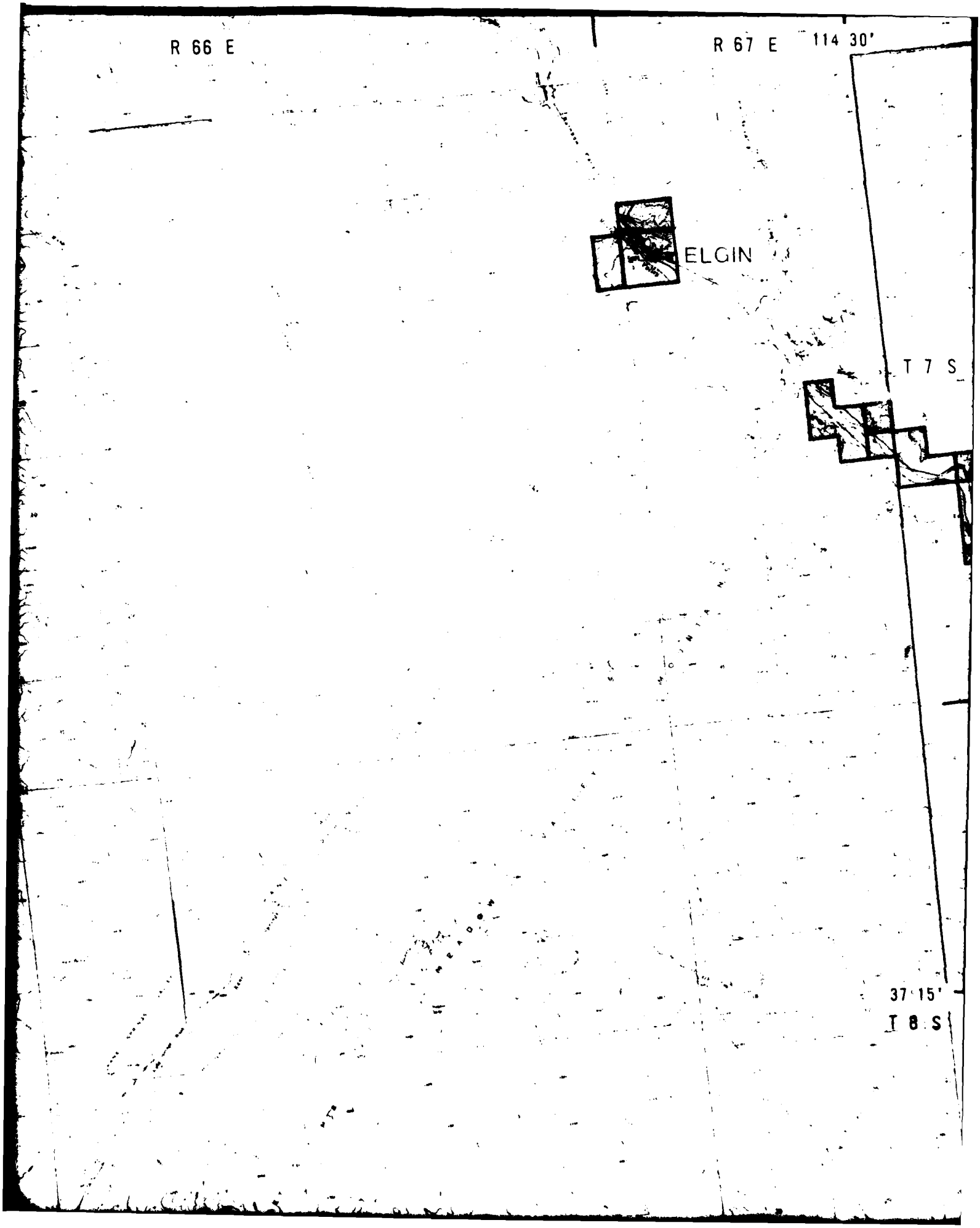


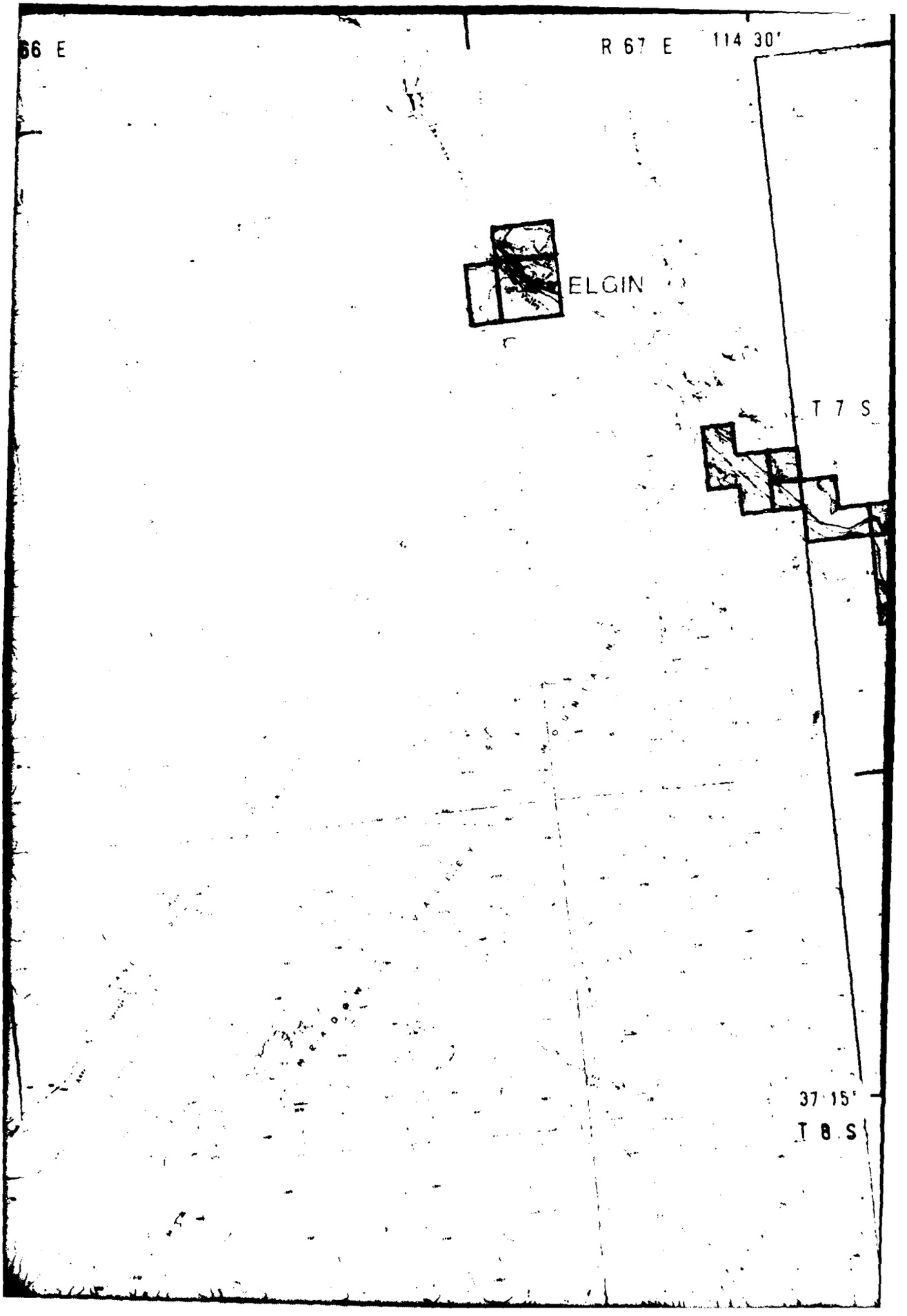

R 64 E
114 45'
DELAMAR MOUNTAINS

114 45°

R 65 E

R 66 E


R 66 E
R 67 E
114 30'
ELGIN
T 7 S
37 15'
T 8 S


66 E
R 67 E
114 30'
ELGIN
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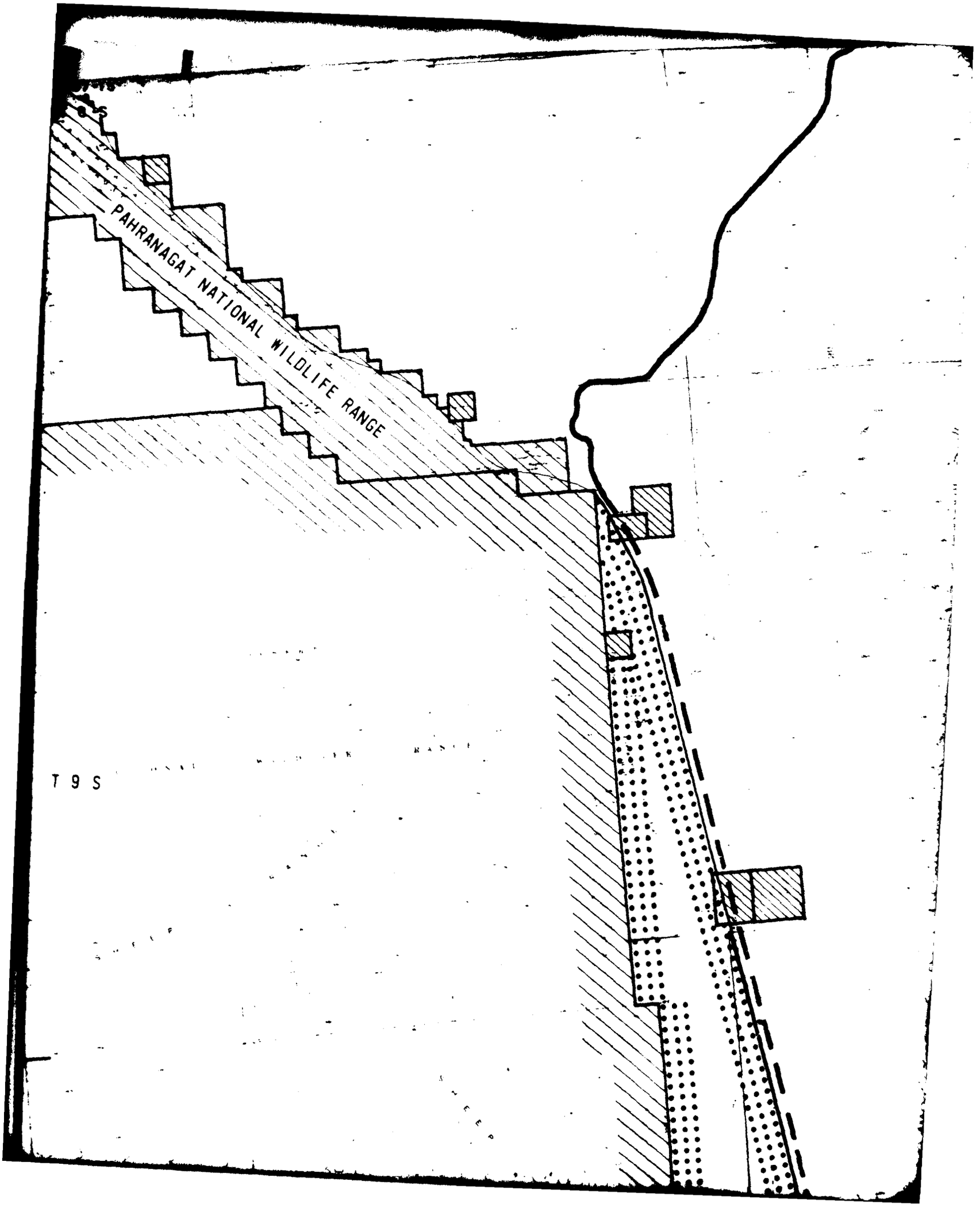
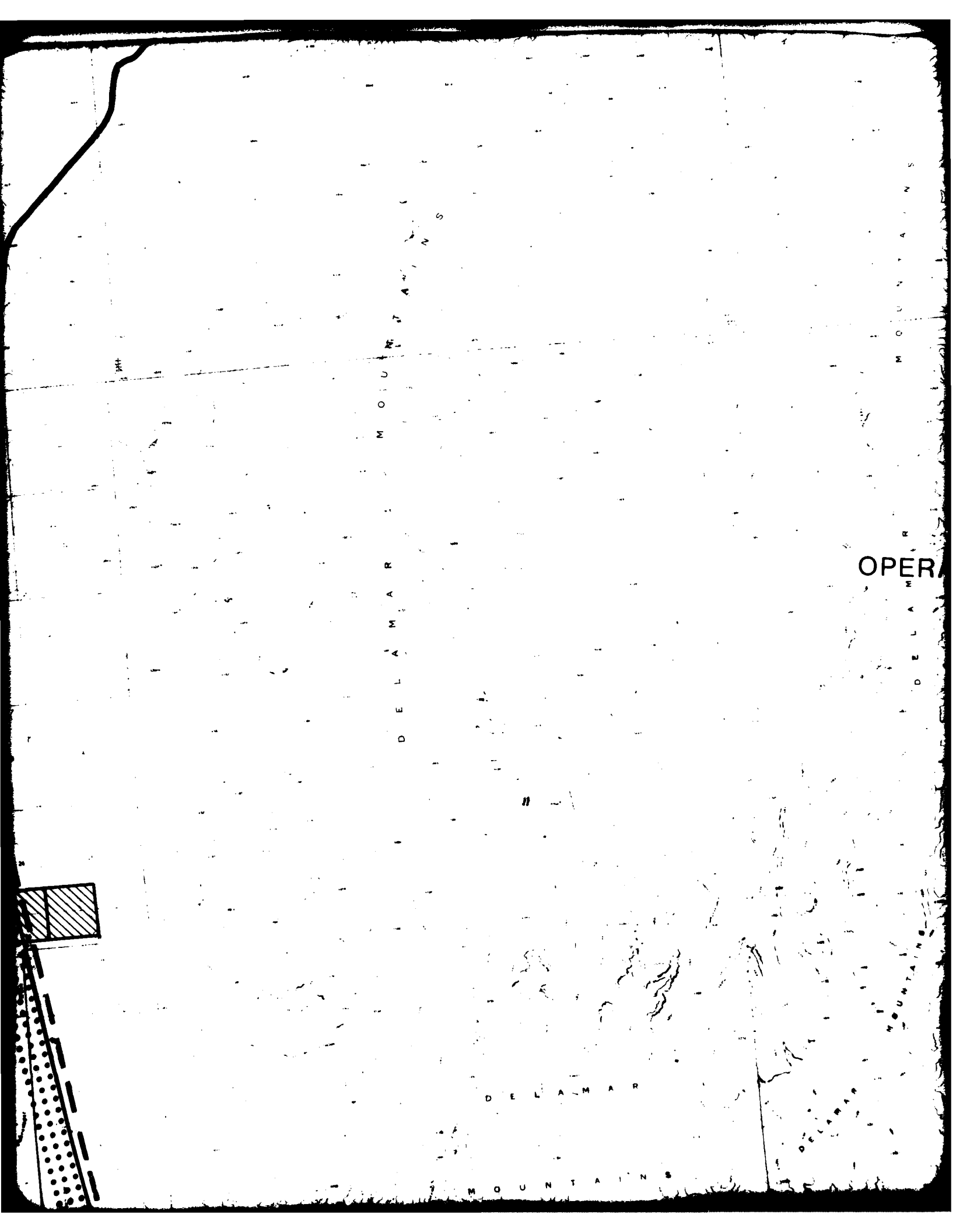
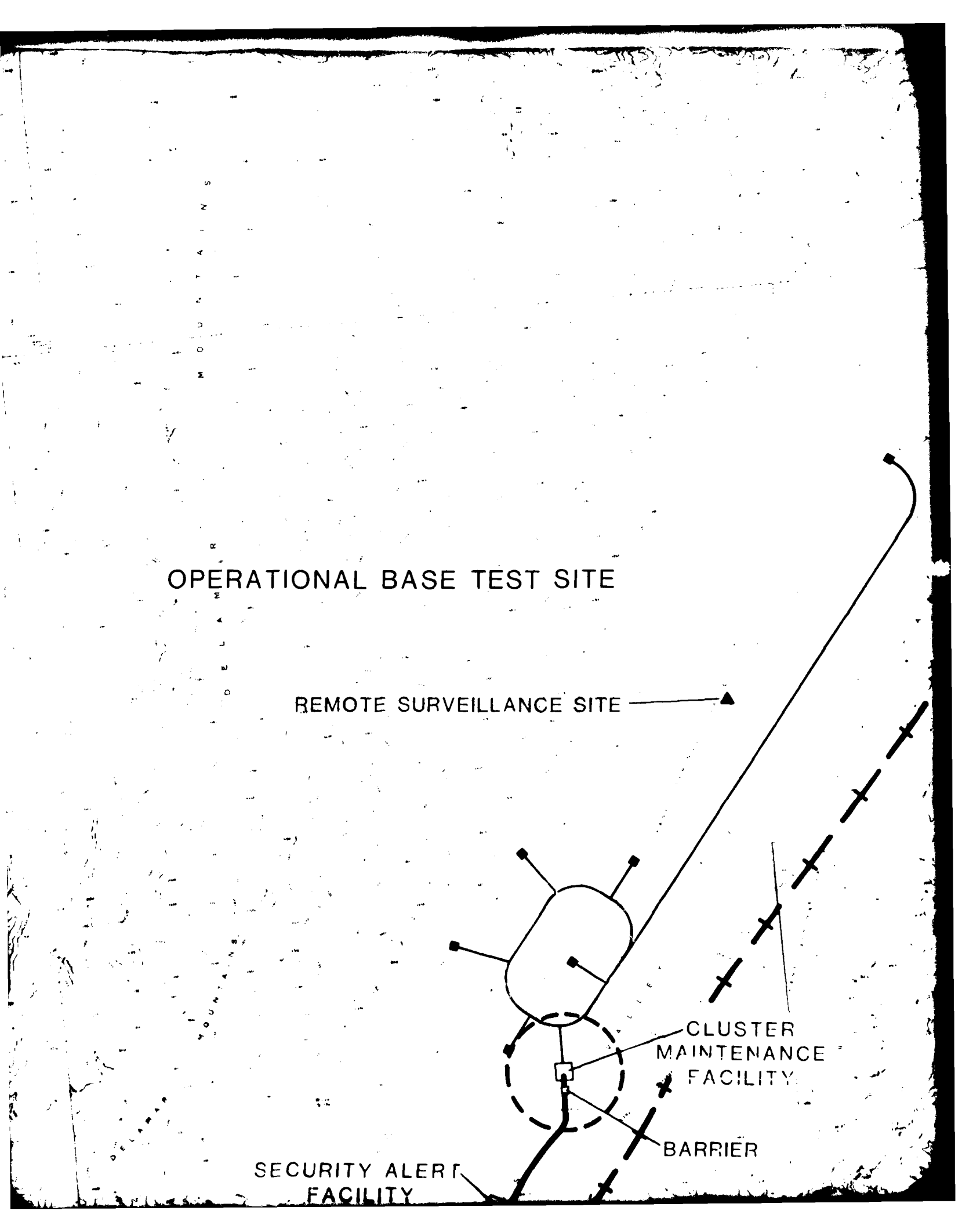
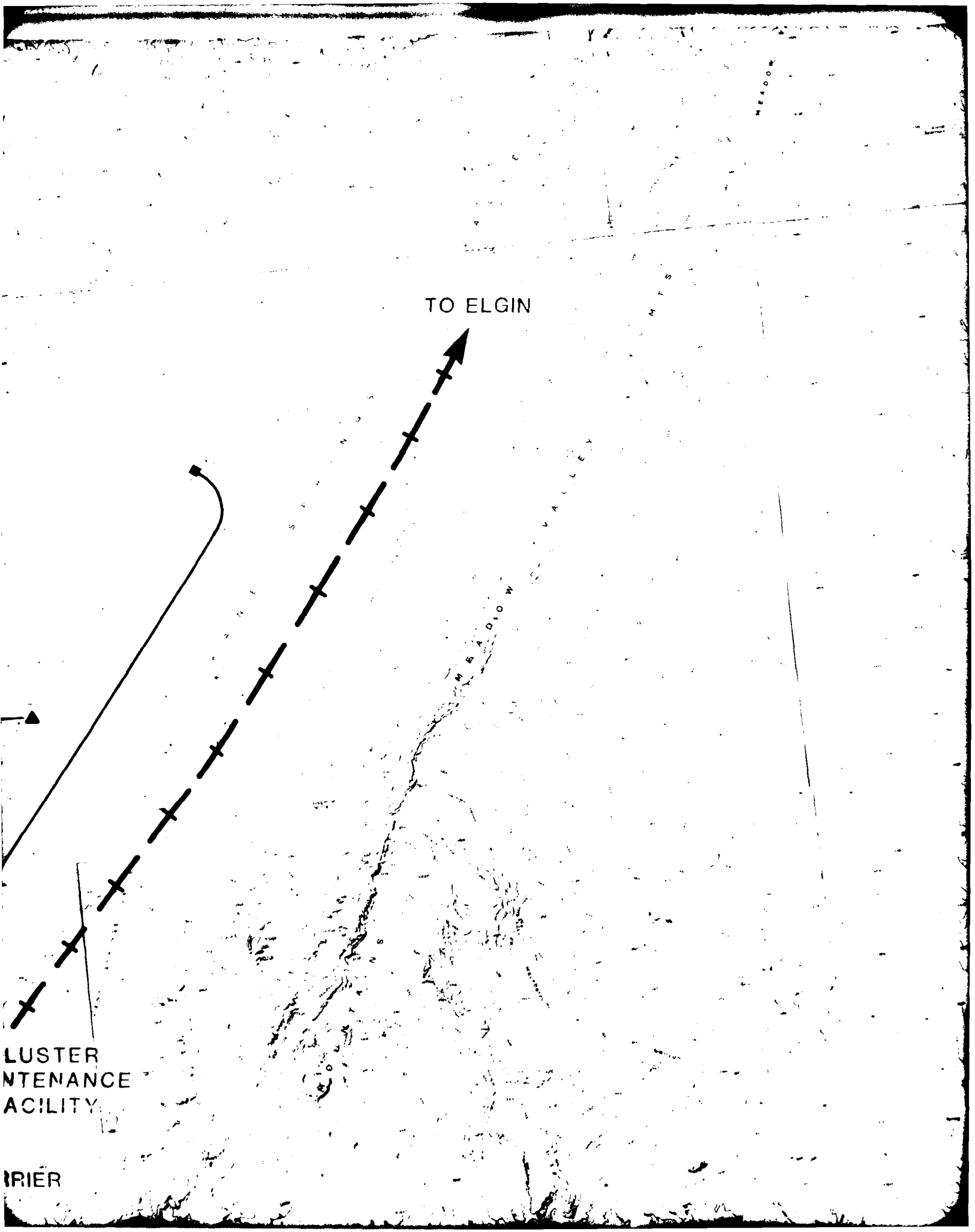
37 15'
T 8 S


PAHRANAGAT NATIONAL WILDLIFE RANGE
T 9 S


DELAMAR MOUNTAINS
DELAMAR MOUNTAINS
DELAMAR MOUNTAINS
OPERA


OPERATIONAL BASE TEST SITE
REMOTE SURVEILLANCE SITE
CLUSTER
MAINTENANCE
FACILITY
BARRIER
SECURITY ALERT
FACILITY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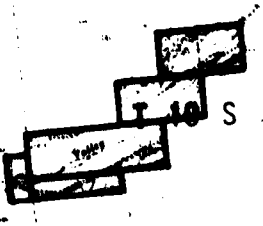
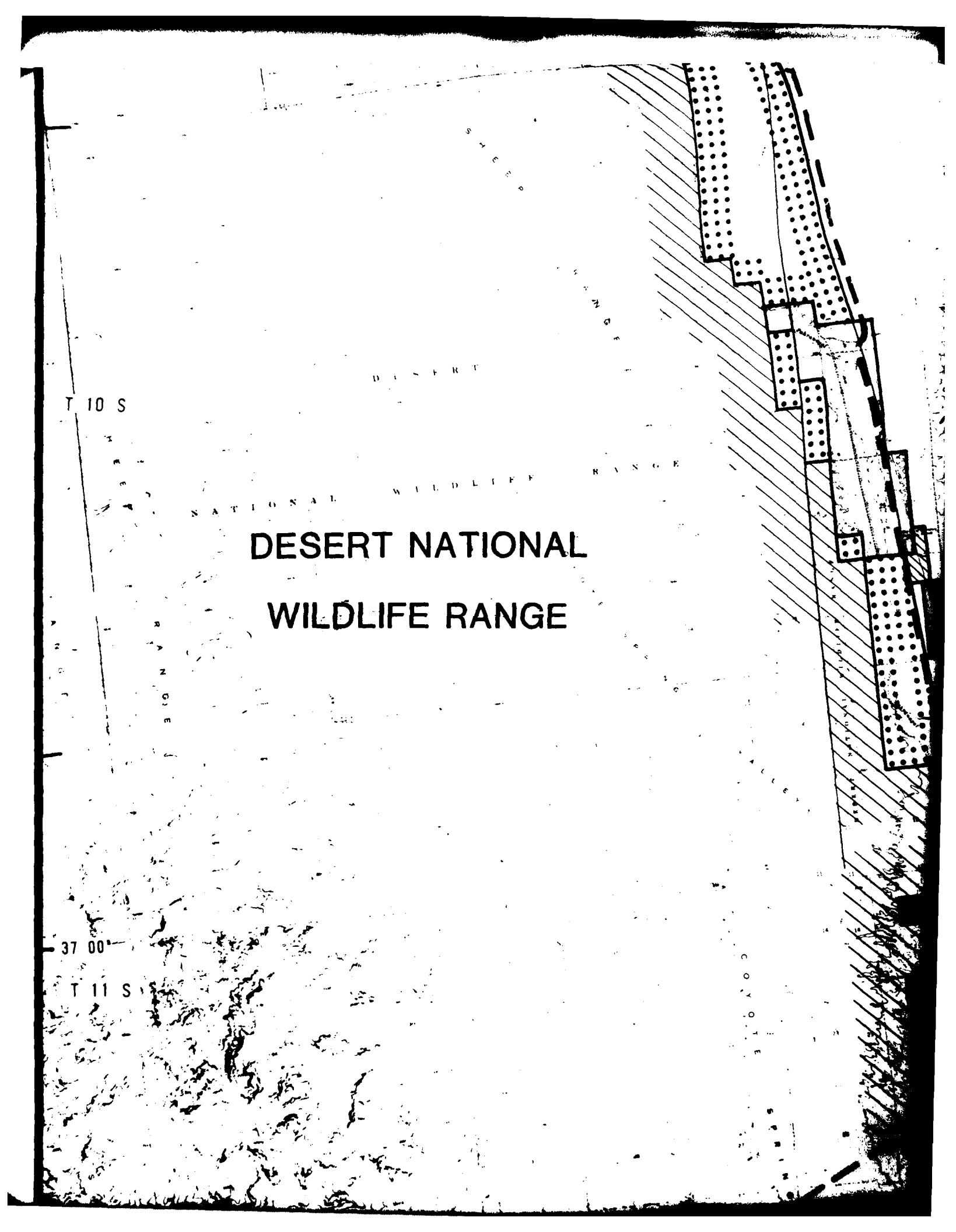
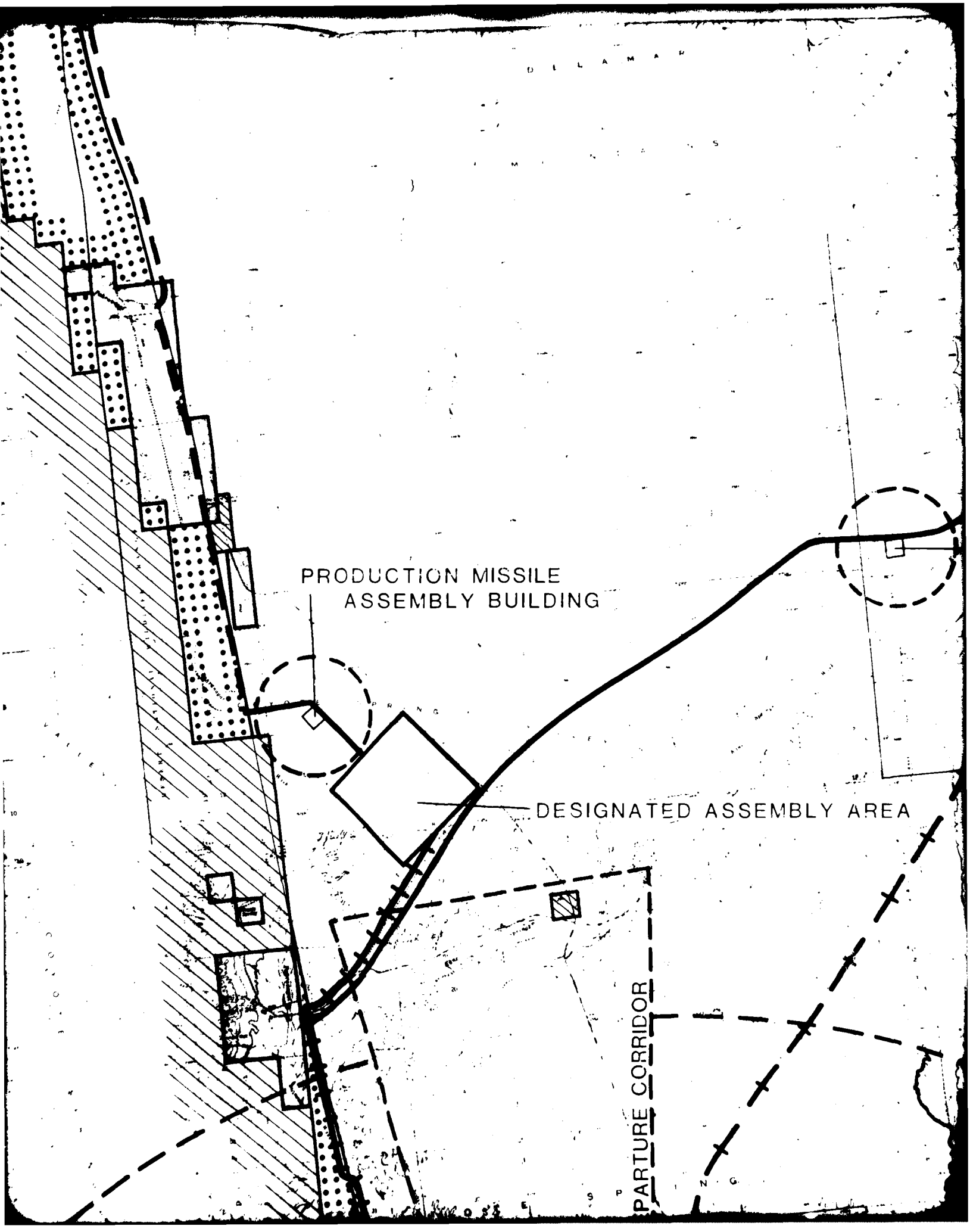
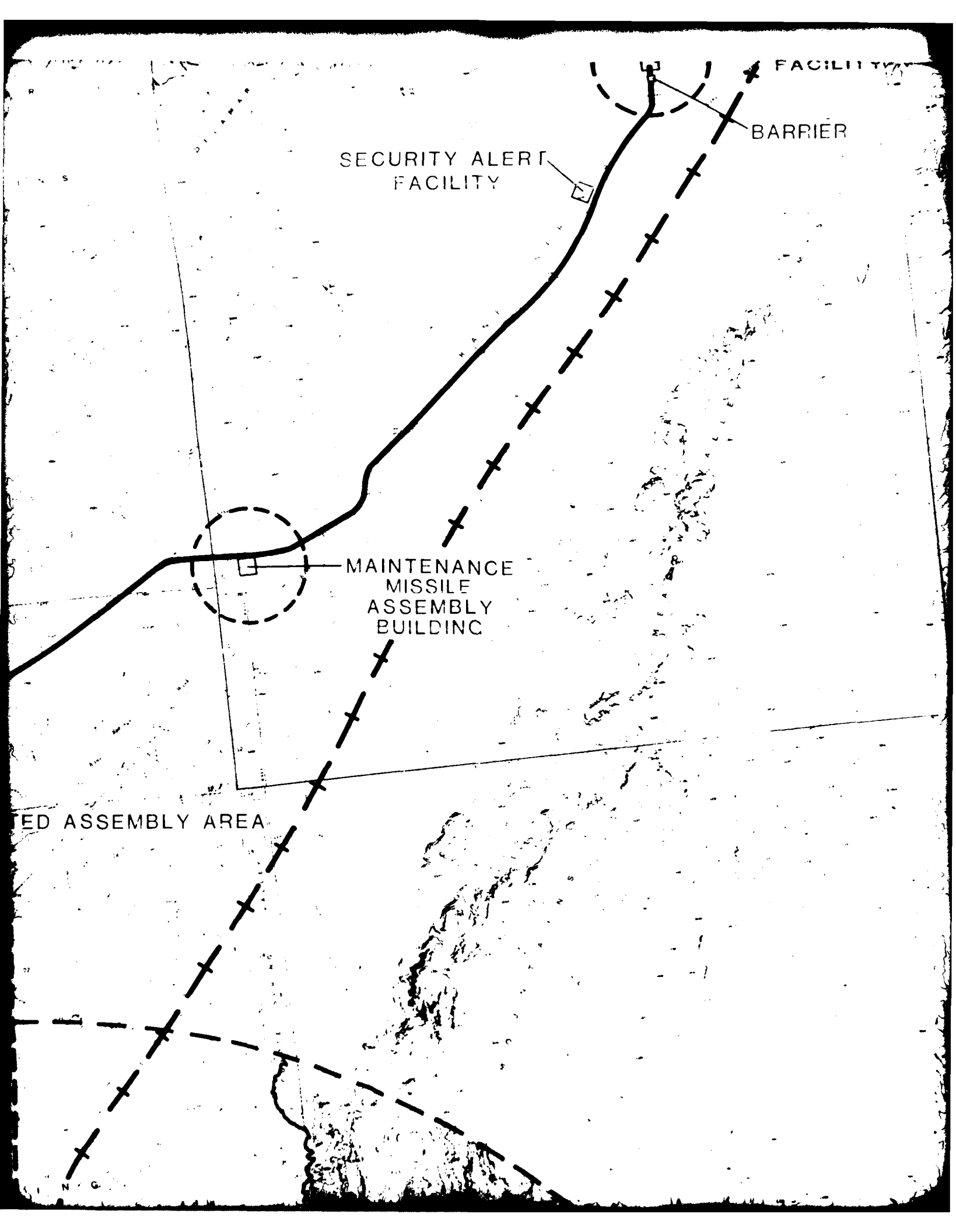
LUSTER
NTENANCE
ACILITY
RIER

T 9 S

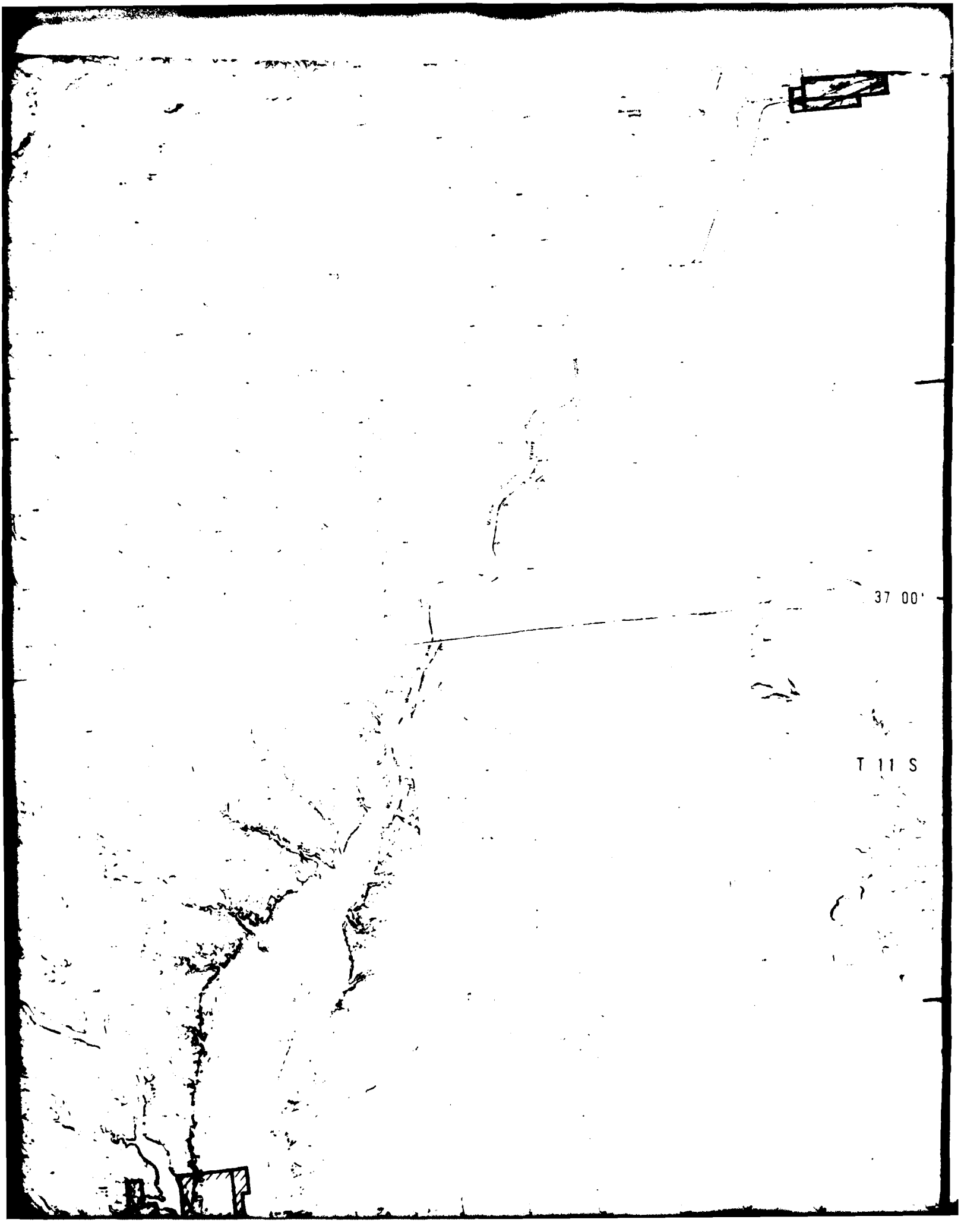


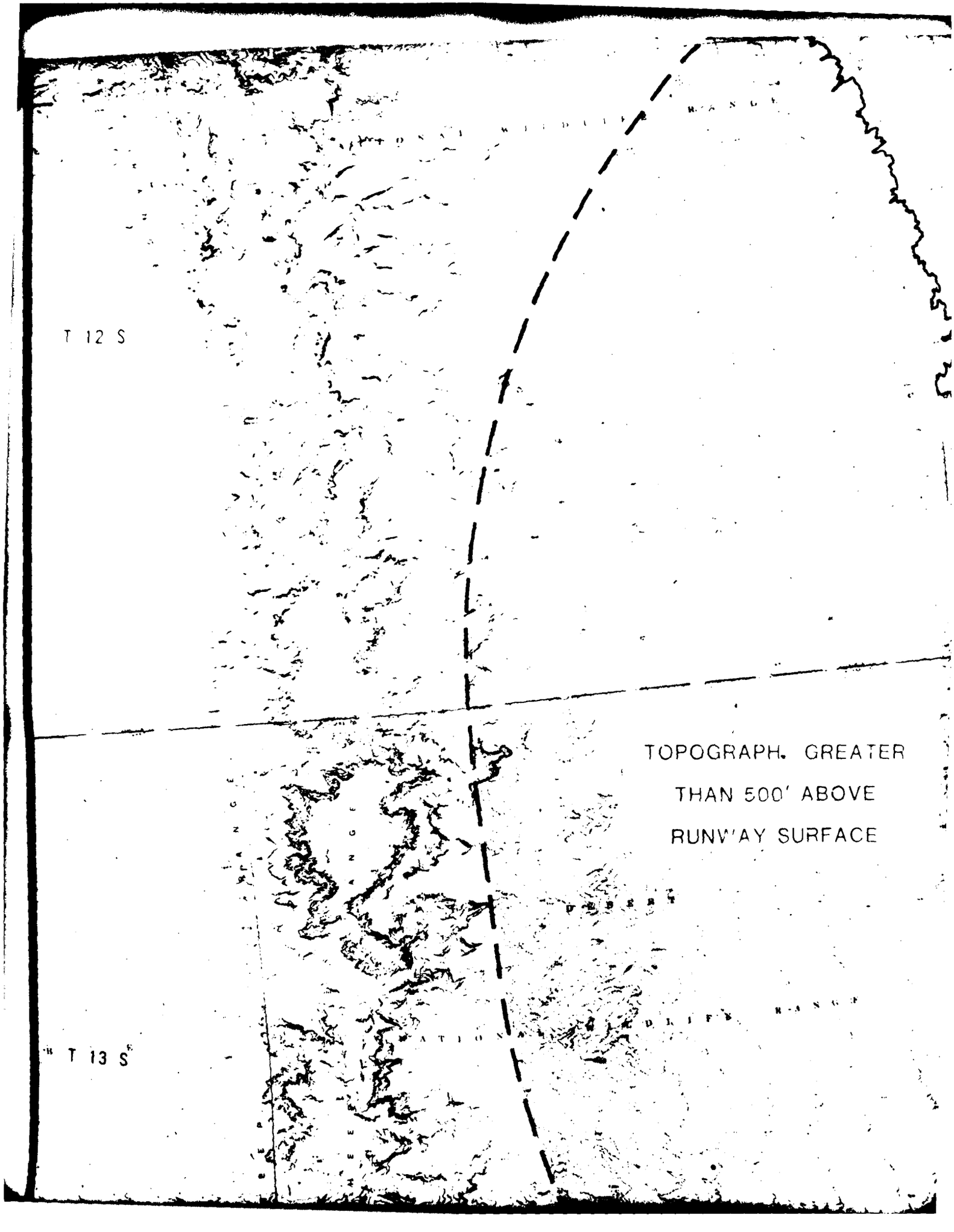

T 10 S
DESERT
NATIONAL WILDLIFE RANGE
DESERT NATIONAL
WILDLIFE RANGE
37 00
T 11 S

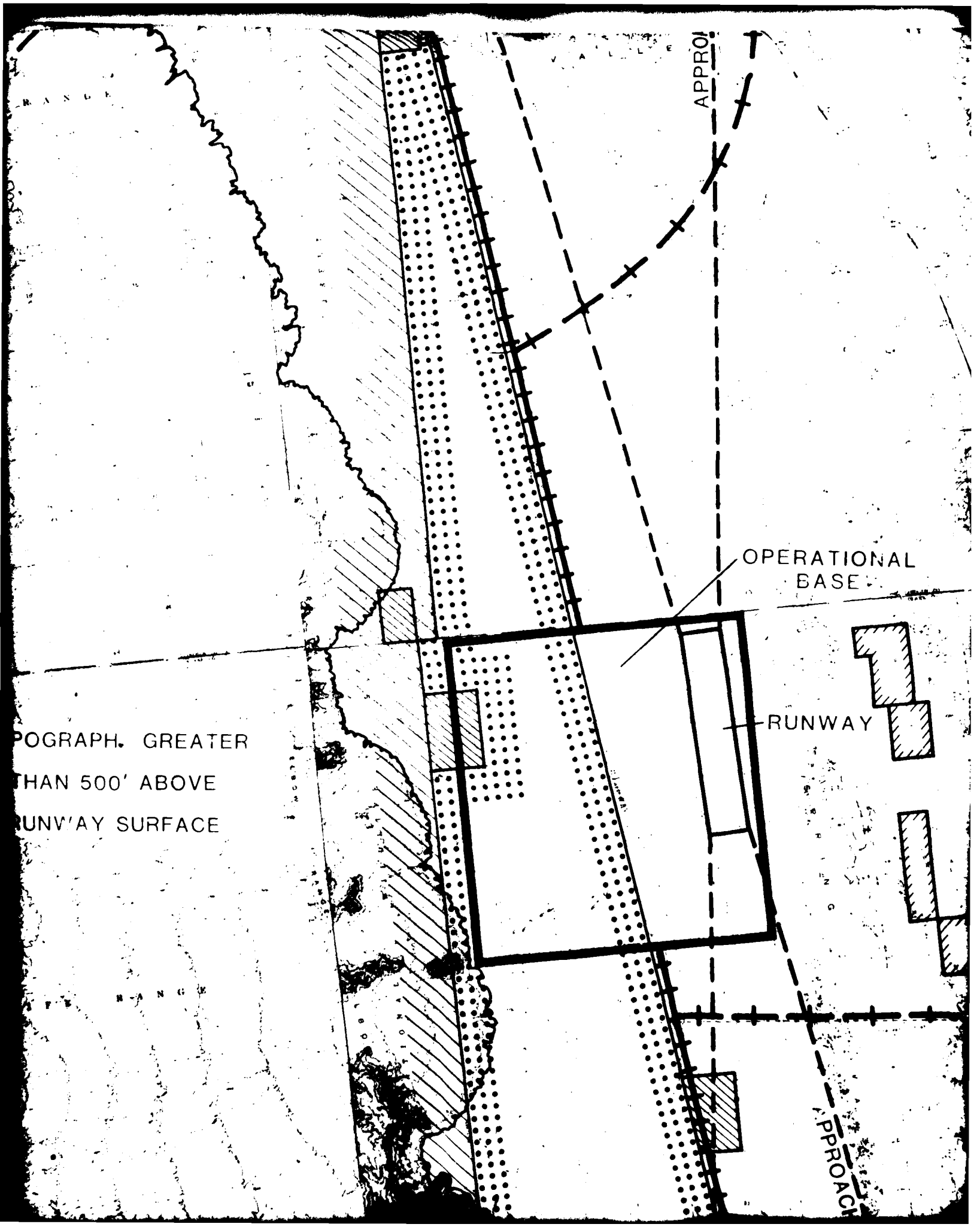

PRODUCTION MISSILE
ASSEMBLY BUILDING
DESIGNATED ASSEMBLY AREA
PARTURE CORRIDOR

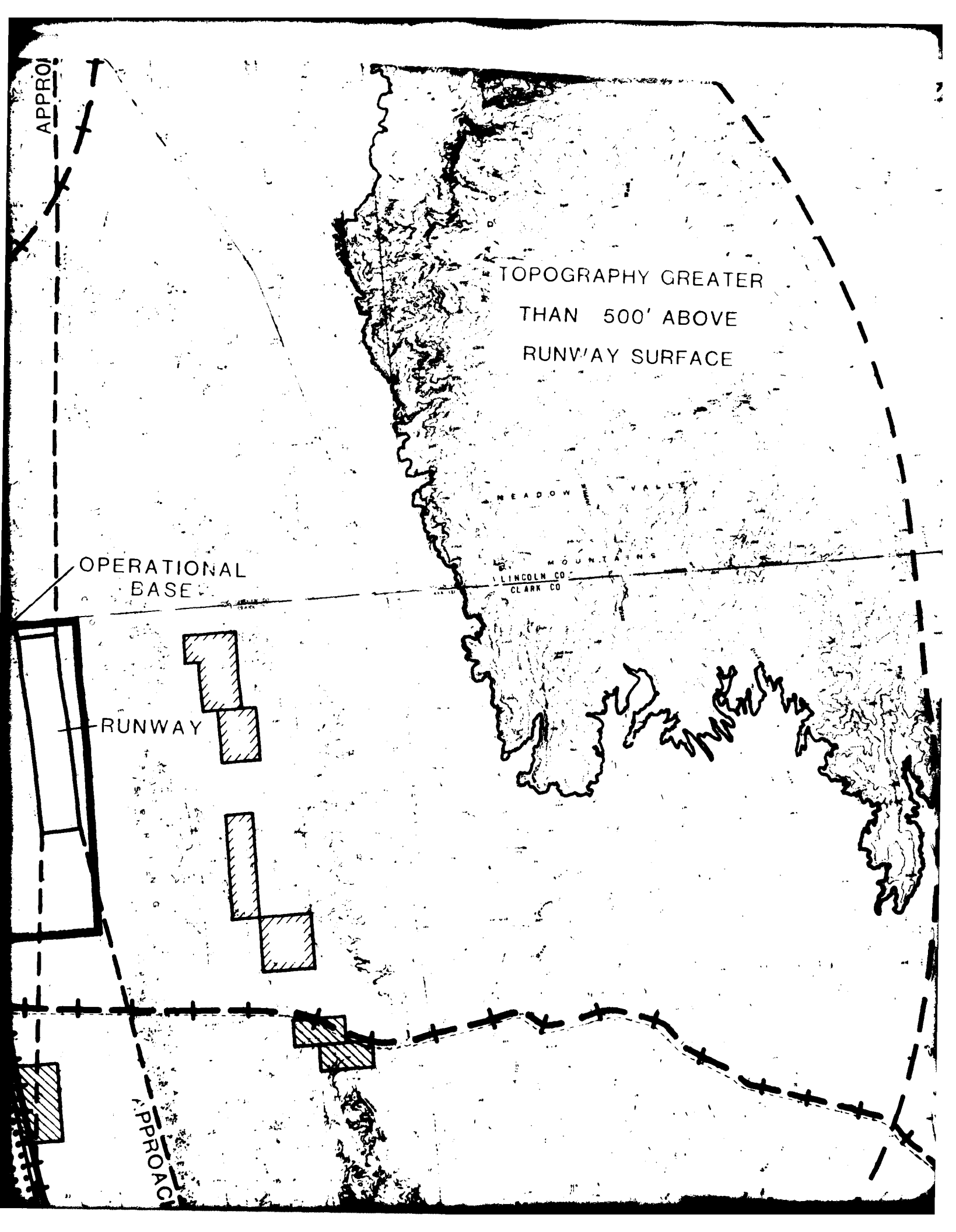

BARRIER
SECURITY ALERT
FACILITY
MAINTENANCE
MISSILE
ASSEMBLY
BUILDING
ED ASSEMBLY AREA

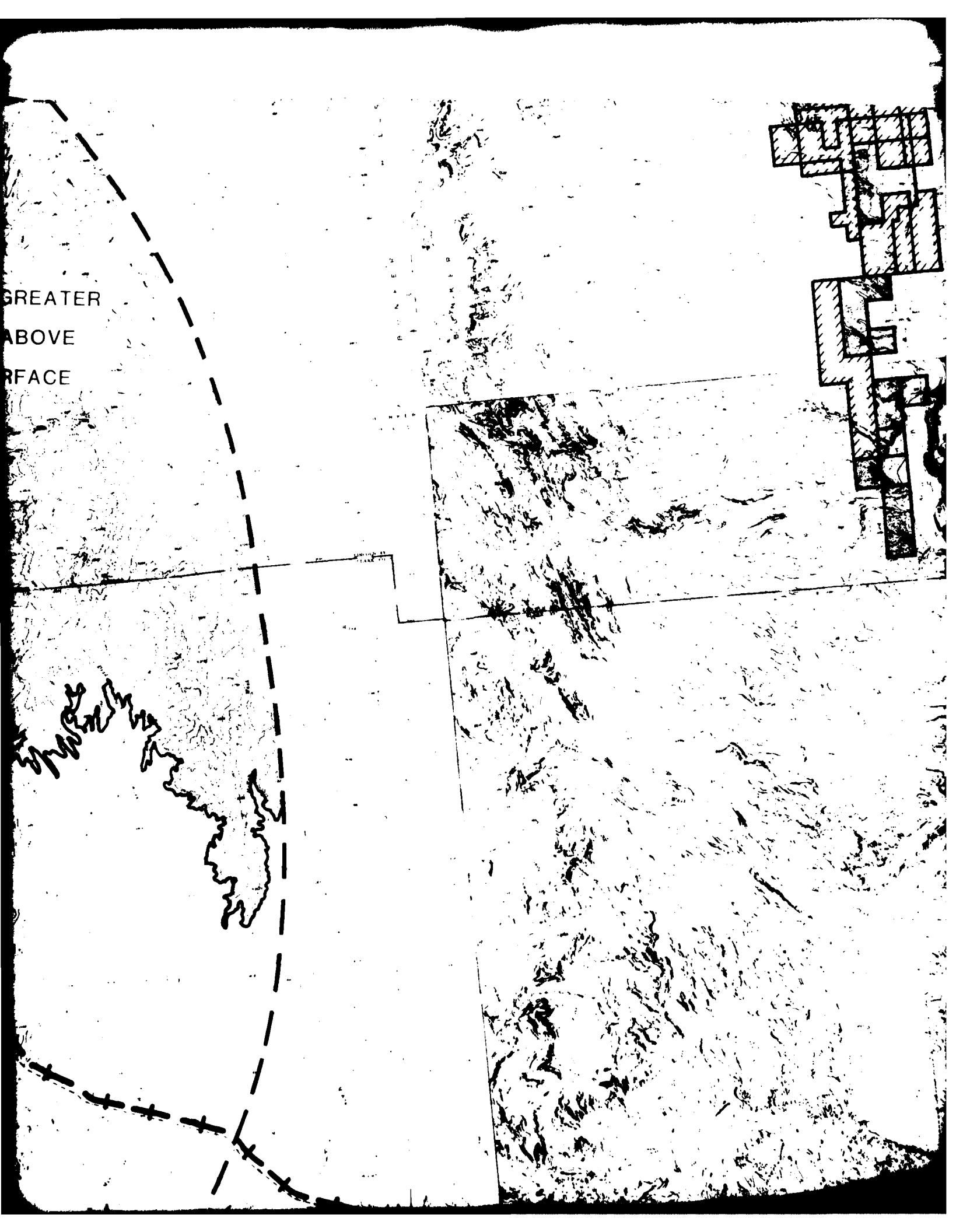

FACILITY
BARRIER
RT

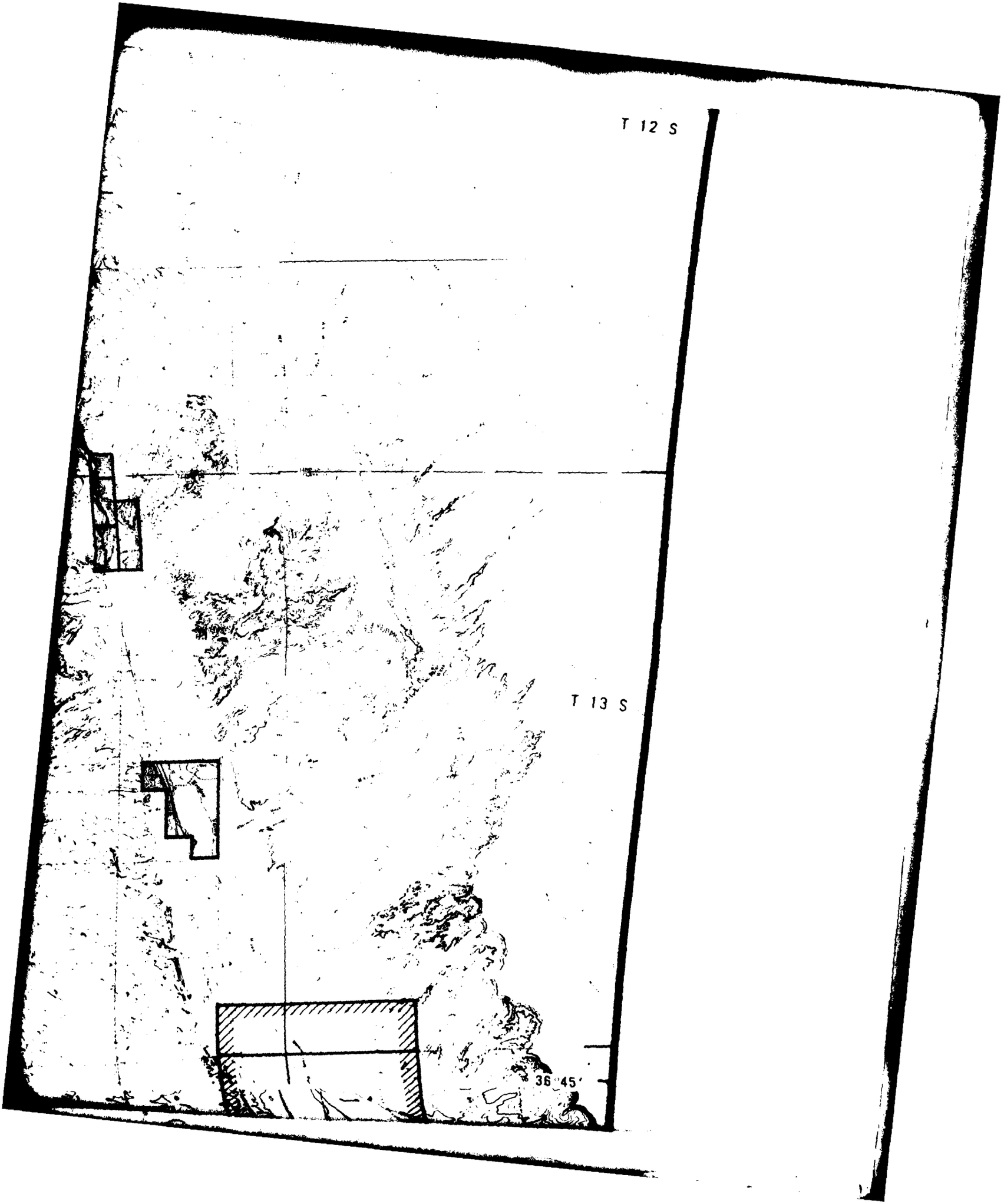

37 00'
T 11 S

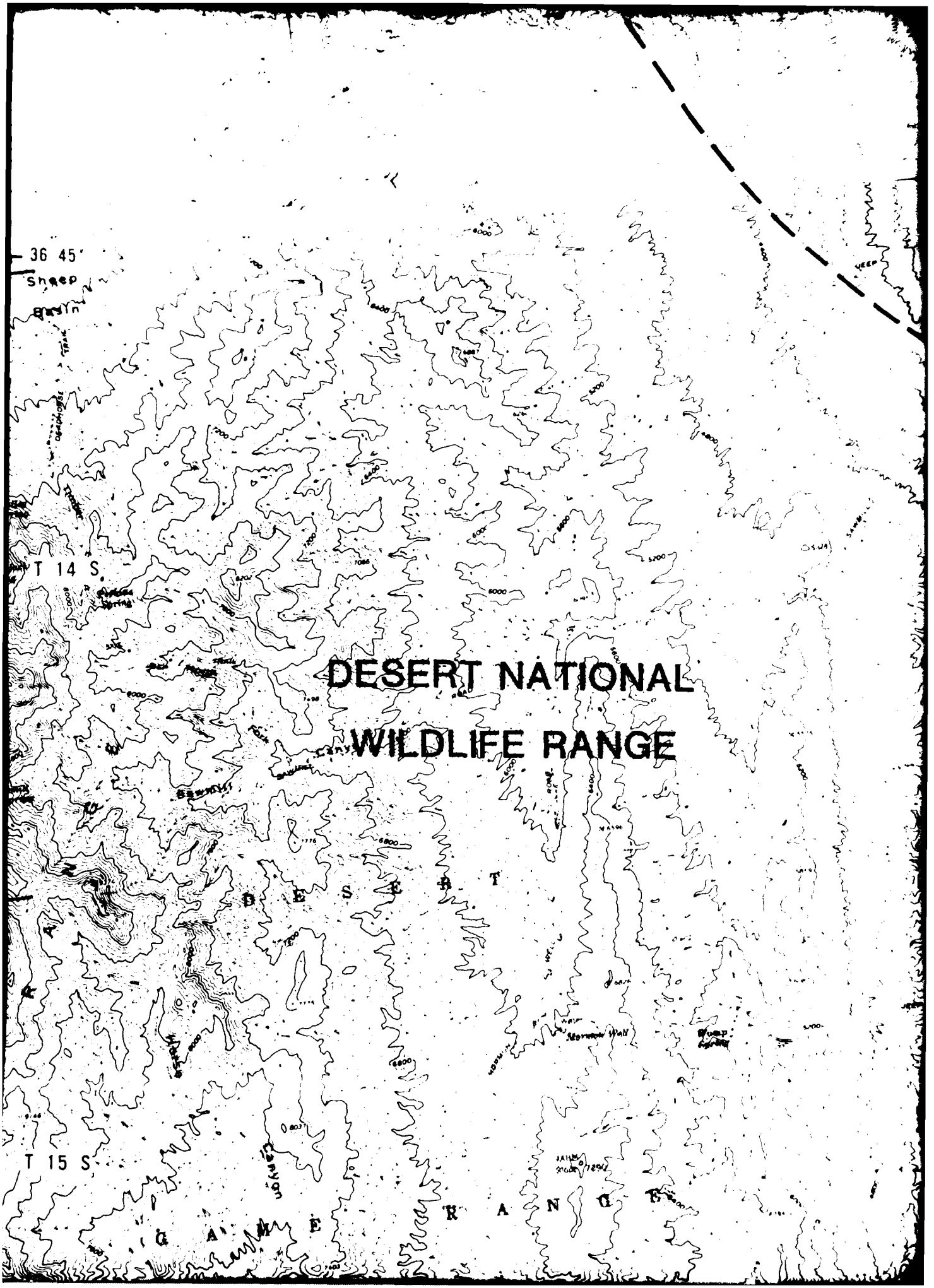

T 12 S
T 13 S
TOPOGRAPH. GREATER
THAN 500' ABOVE
RUNWAY SURFACE


APPRO
OPERATIONAL
BASE
RUNWAY
POGRAPH. GREATER
THAN 500' ABOVE
UNWAY SURFACE
PPROACH

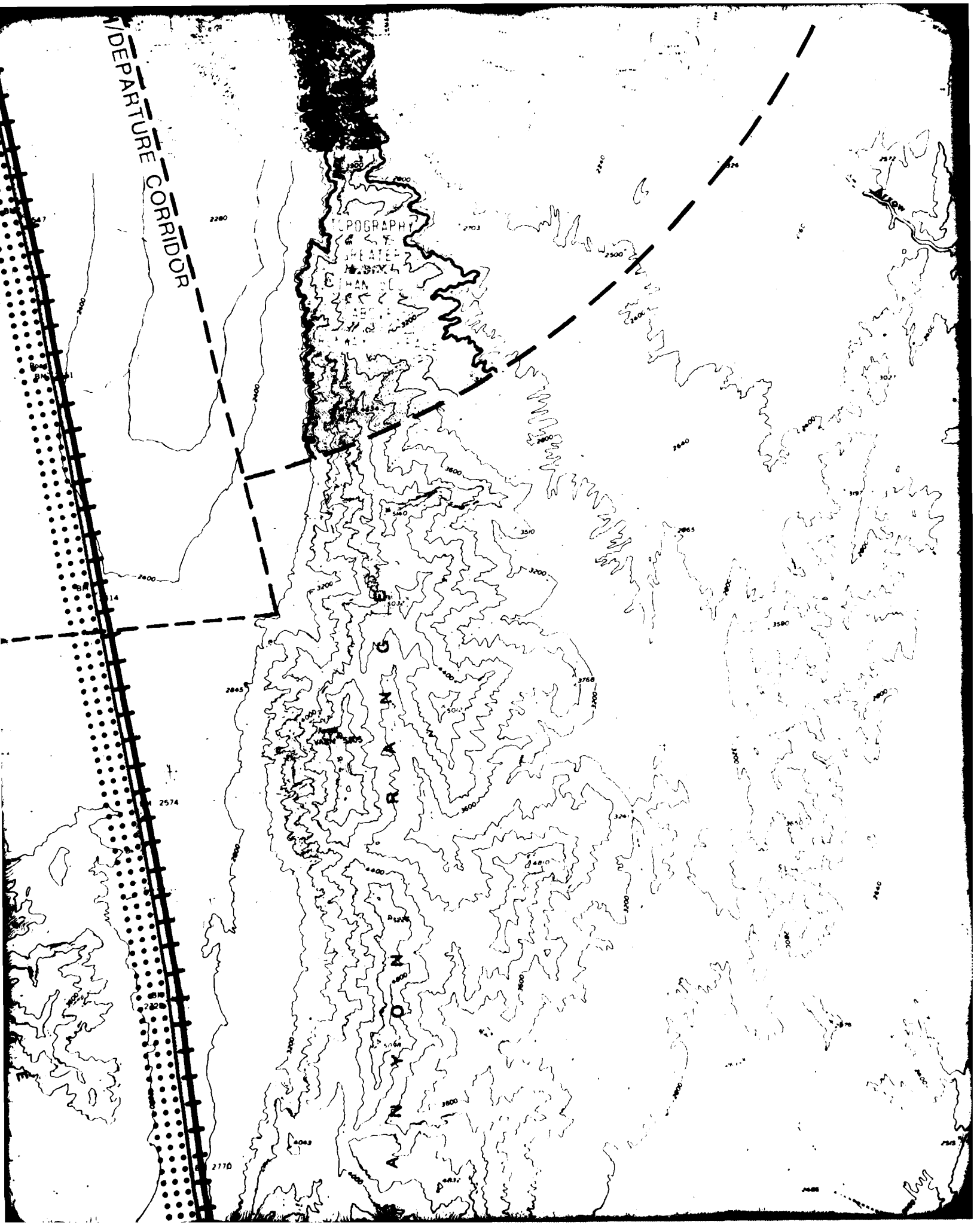

APPRO
TOPOGRAPHY GREATER
THAN 500' ABOVE
RUNWAY SURFACE
MEADOW VALLEY
MOUNTAINS
LINCOLN CO
CLARK CO
OPERATIONAL
BASE
RUNWAY
APPROACH

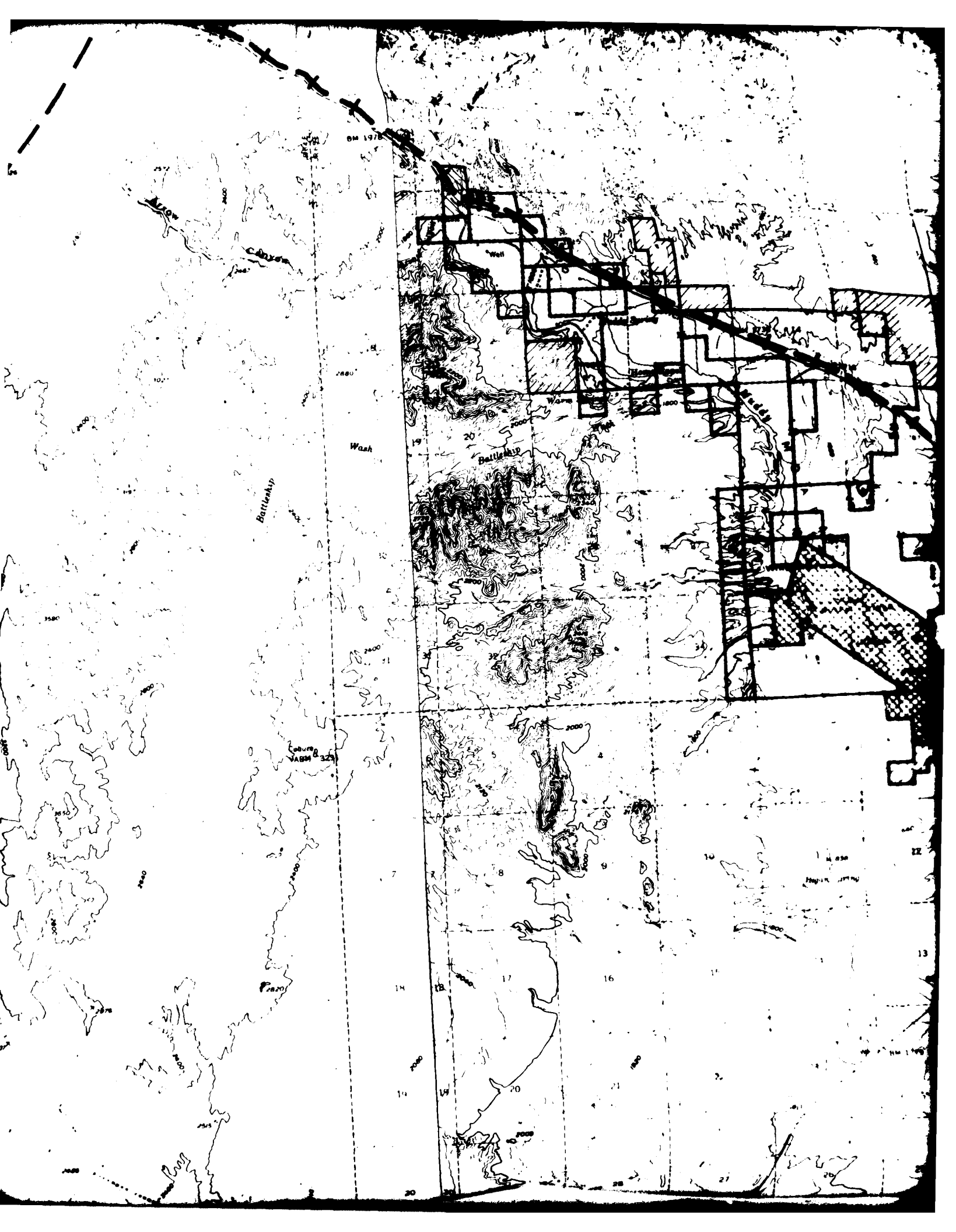

GREATER
ABOVE
RFACE

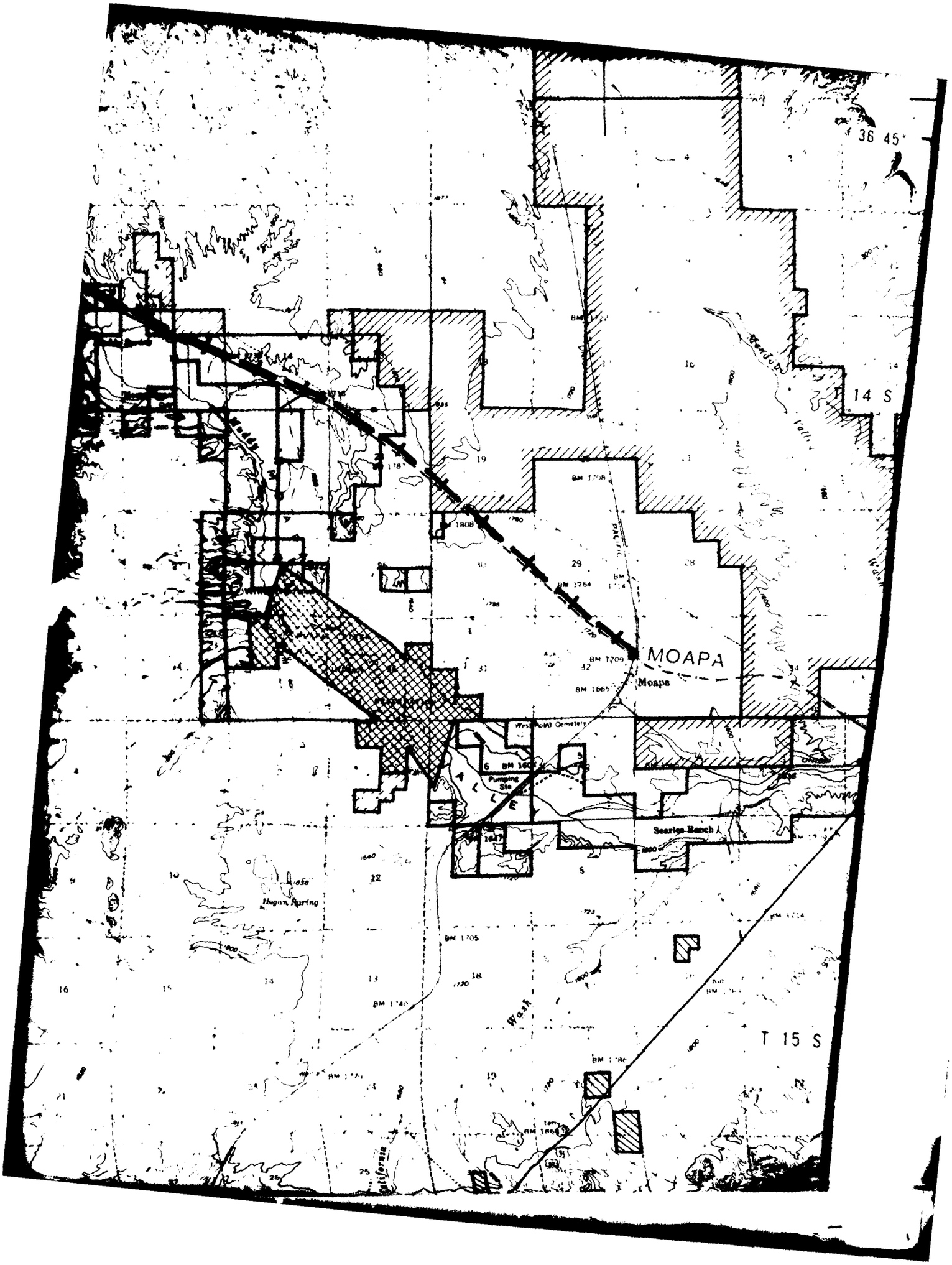

T 12 S
T 13 S
36°45'

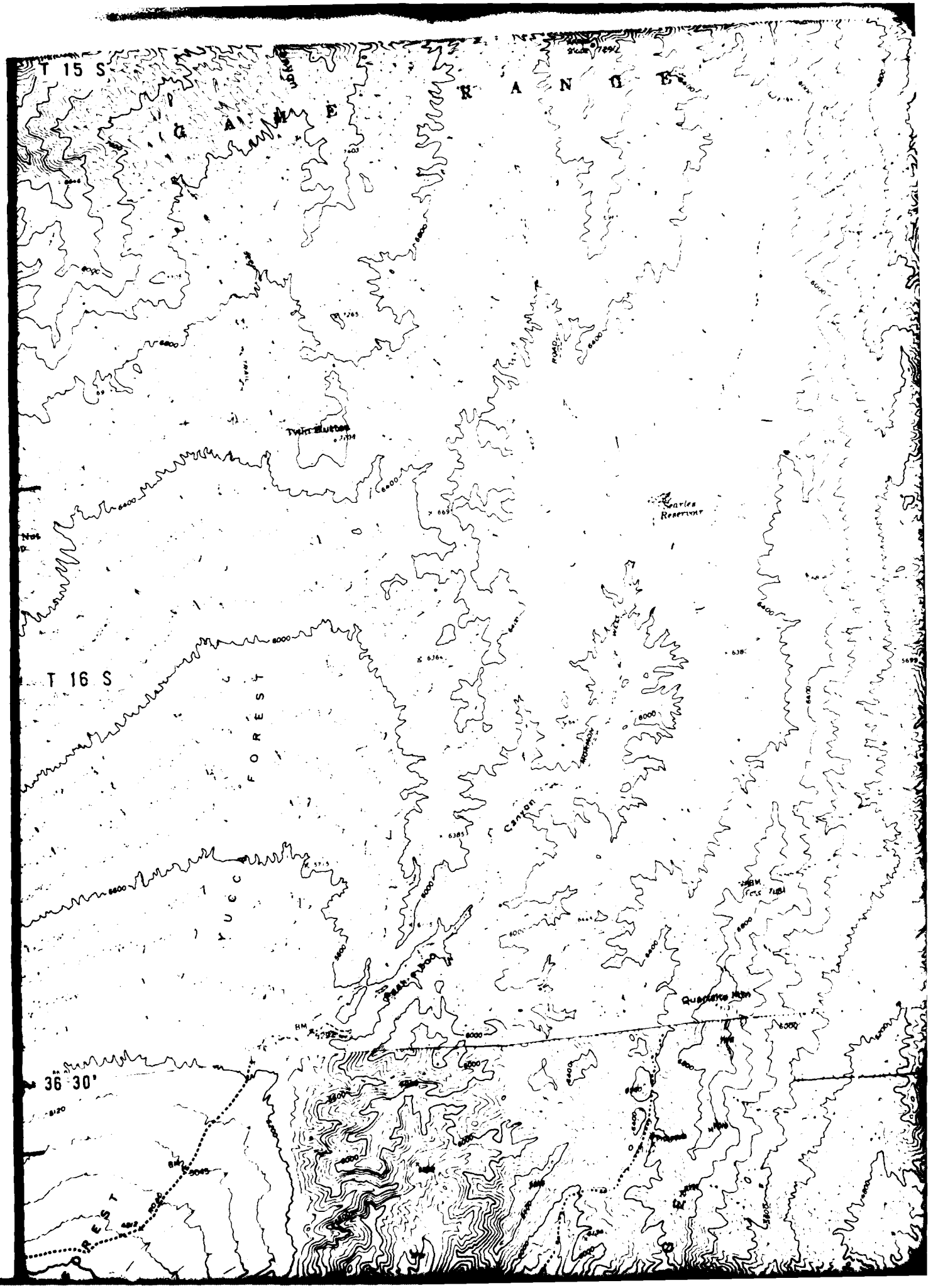

36 45'
T 14 S.
T 15 S.
DESERT NATIONAL
WILDLIFE RANGE
DESERT
RANGE

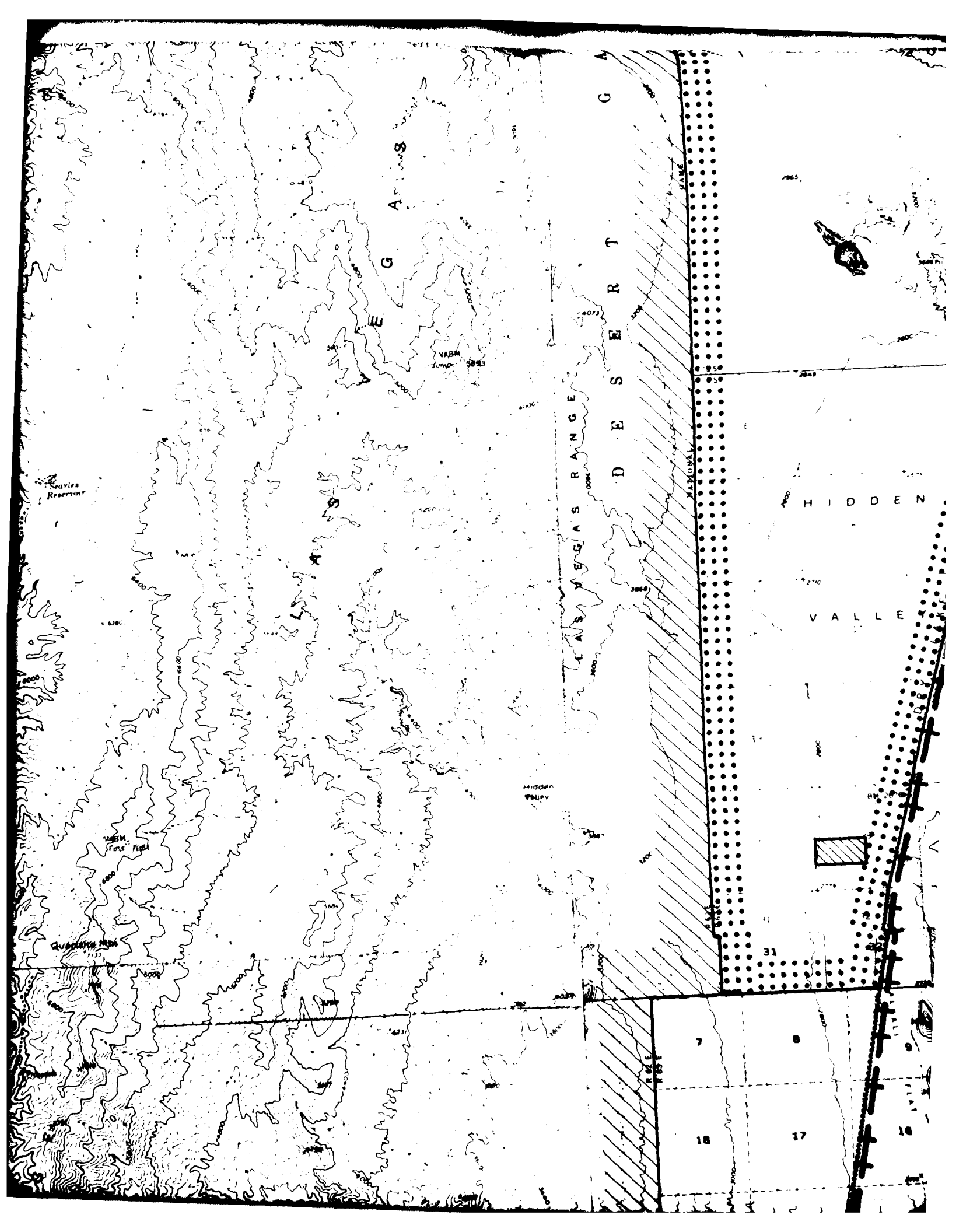
EPARTURE CORRIDOR
SAWMILL
Canyon
Eldow
Eldow
Canyon
TRAIL
JEEP
ROAD
SAWMILL
RANGE
GAME
RANGE
RANGE
2574

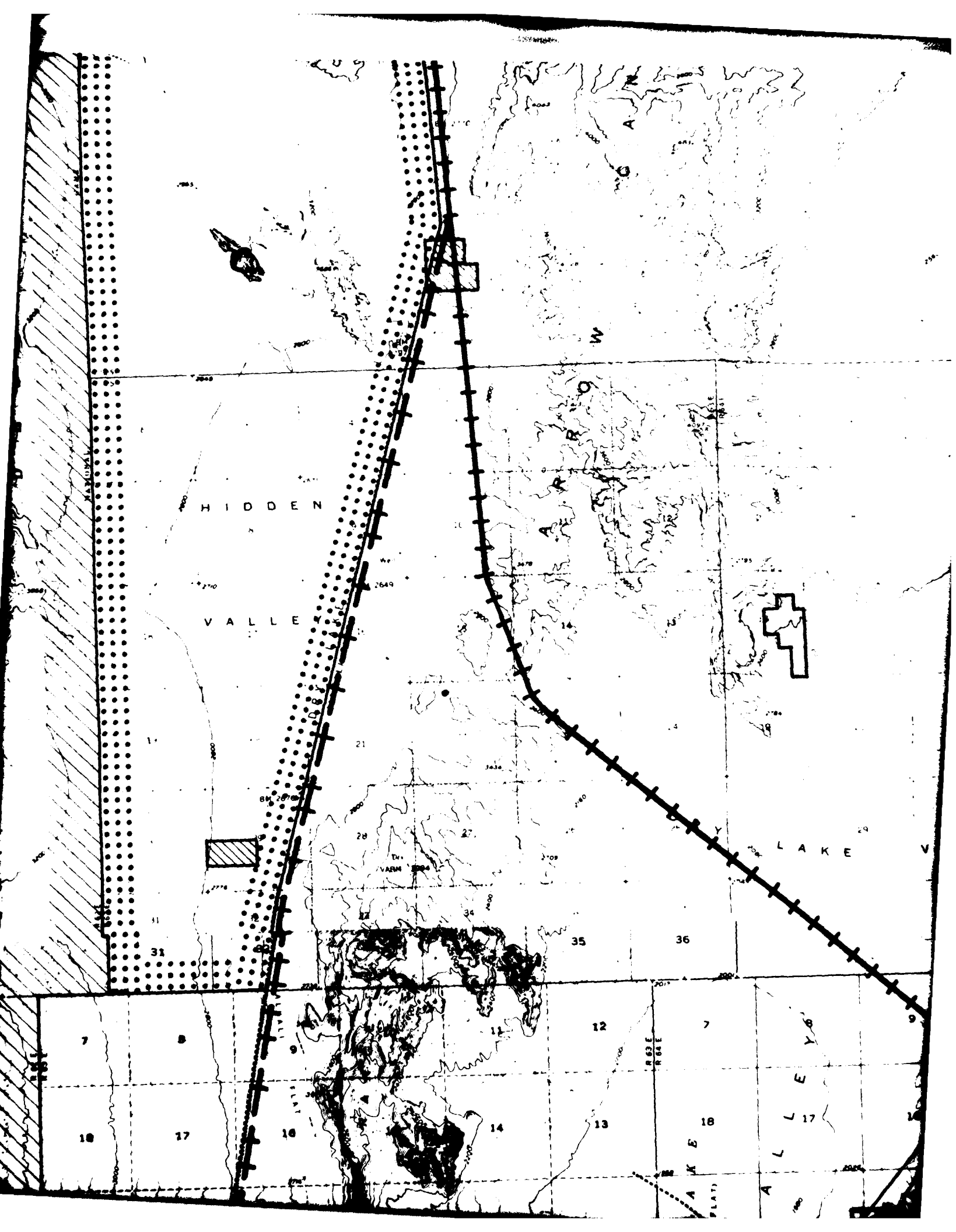

DEPARTURE CORRIDOR
TOPOGRAPHY
GRAND CANYON

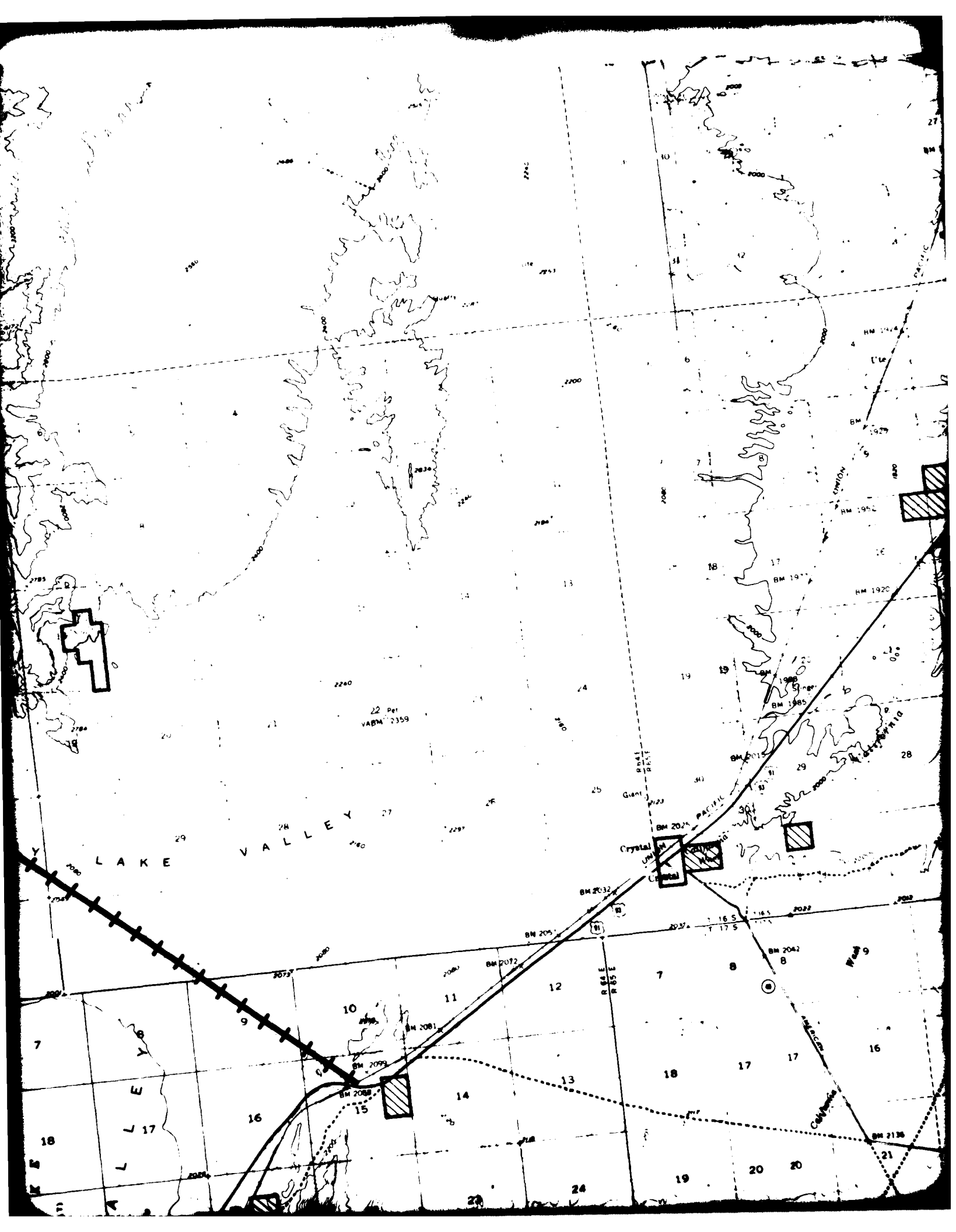

Wash
Battleship
Wash
Battleship
Coburn
VABM 3231

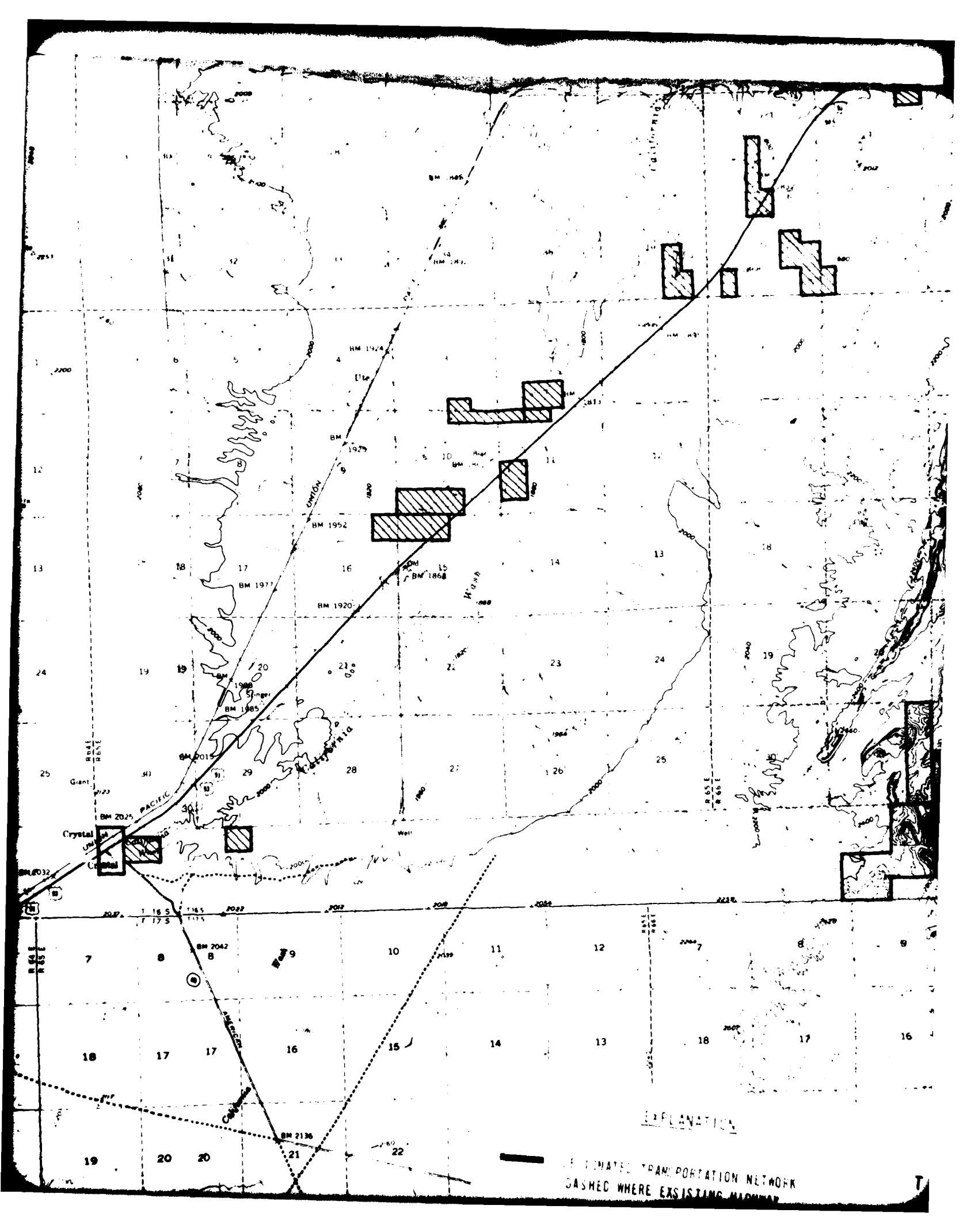

36 45'
T 14 S
MOAPA
Moapa
Pumping Site
Searles Ranch
Hogan Spring
T 15 S

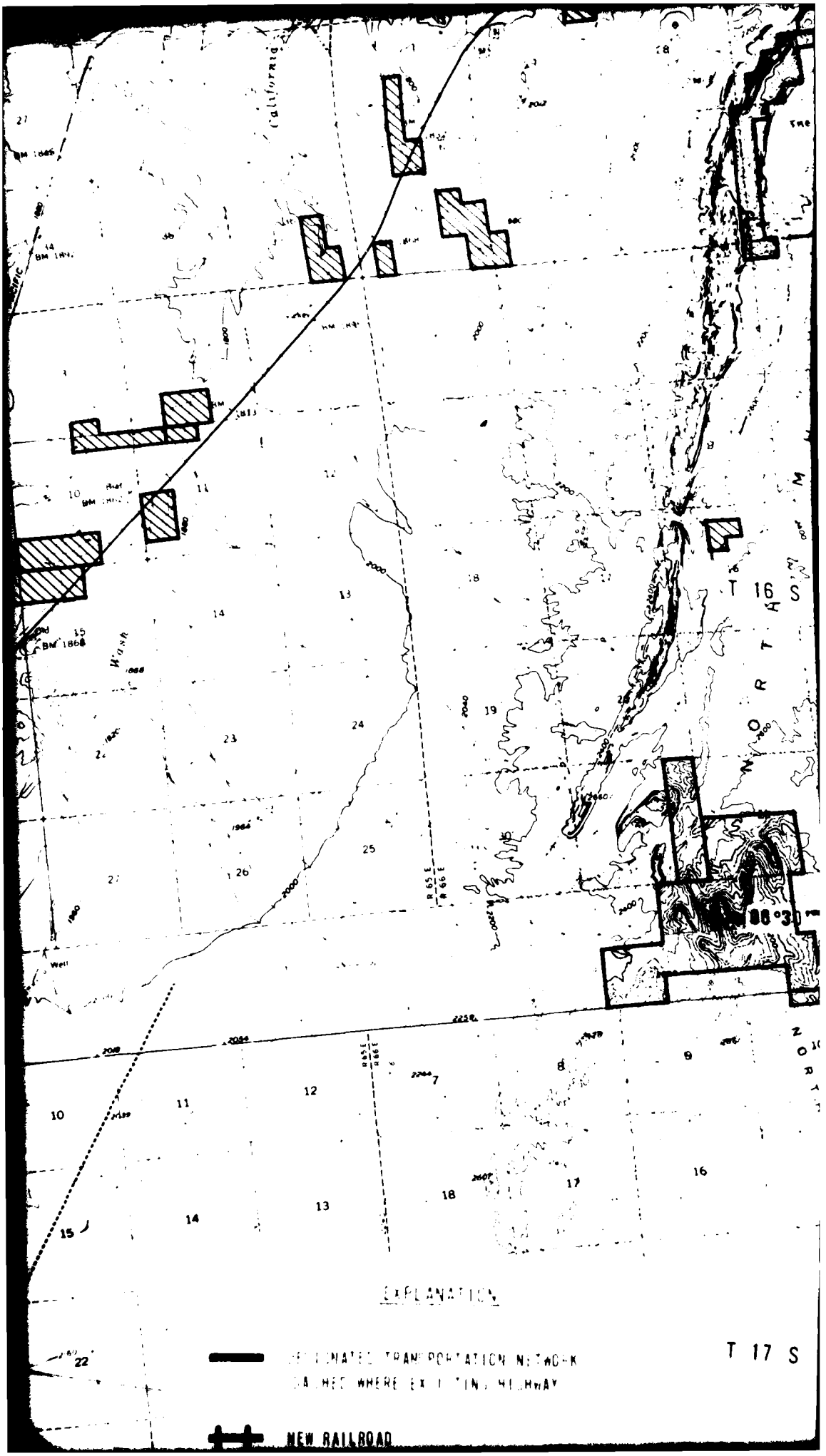

T 15 S
R A N G E
Twin Buttes
Charles Reservoir
T 16 S
FOREST
Canyon
Quesada Mtn
36° 30'

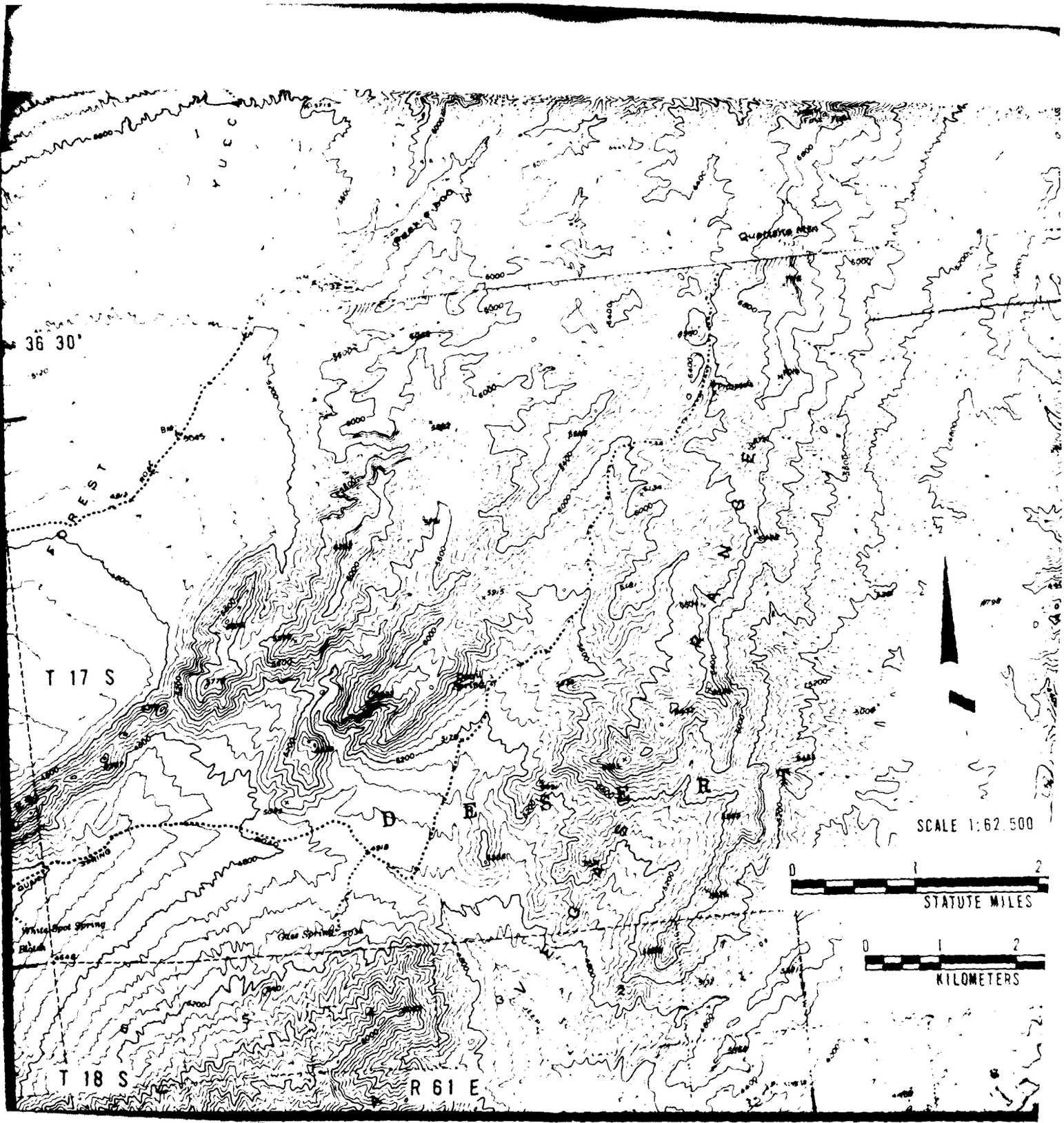

LAS VEGAS RANGE
DESERT
NATIONAL
HIDDEN
VALLE
Charleston Reservation
Hidden Valley
31
7
8
18
17
16

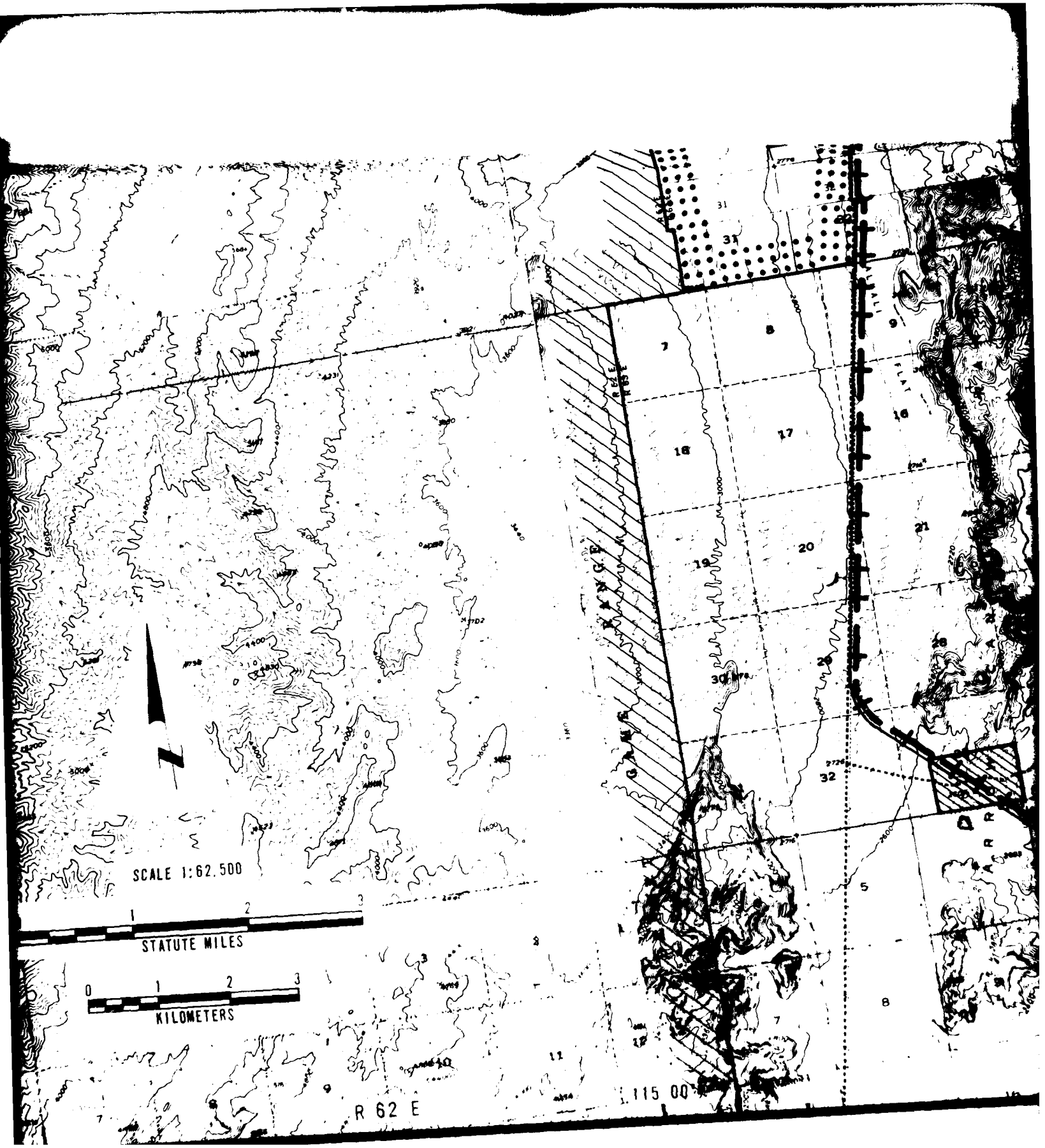

HIDDEN
VALLEY
LAKE
VALLEY
R 63 E
R 64 E


LAKE VALLEY
Crystal
Union
Pacific
Giant
Cowboy
BM 2025
BM 2032
BM 2072
BM 2081
BM 2088
BM 2042
BM 2136
BM 1985
BM 1952
BM 1929
BM 1920
22 Per
VABM 2359

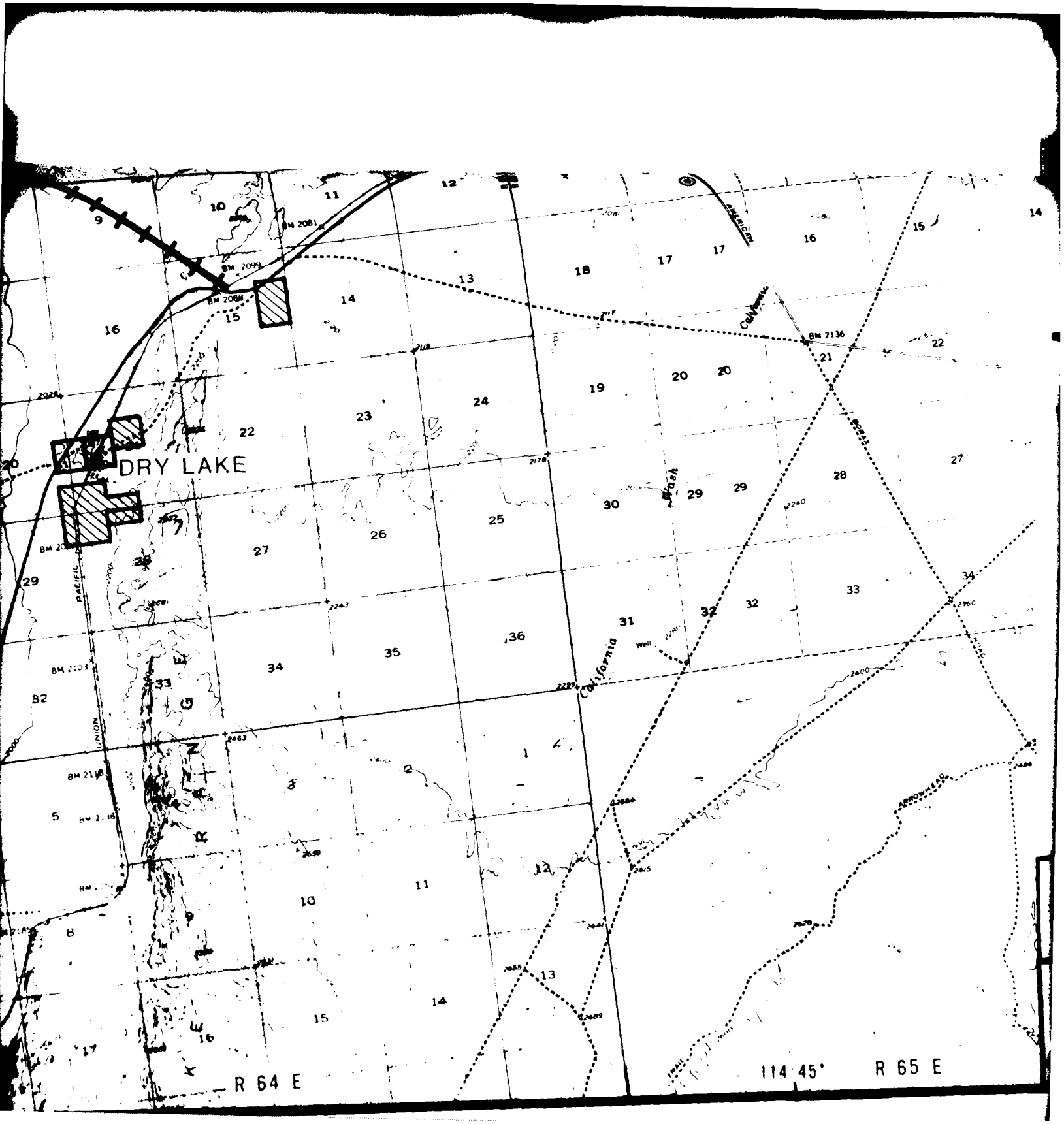

BM 1924
BM 1929
BM 1952
BM 1977
BM 1868
BM 1920
BM 1988
BM 1985
BM 2015
BM 2025
BM 2042
BM 2136
Union
Pacific
Crystal
Well
Giant
EXPLANATION
ESTIMATED TRANSPORTATION NETWORK
DASHED WHERE EXISTING MAJOR

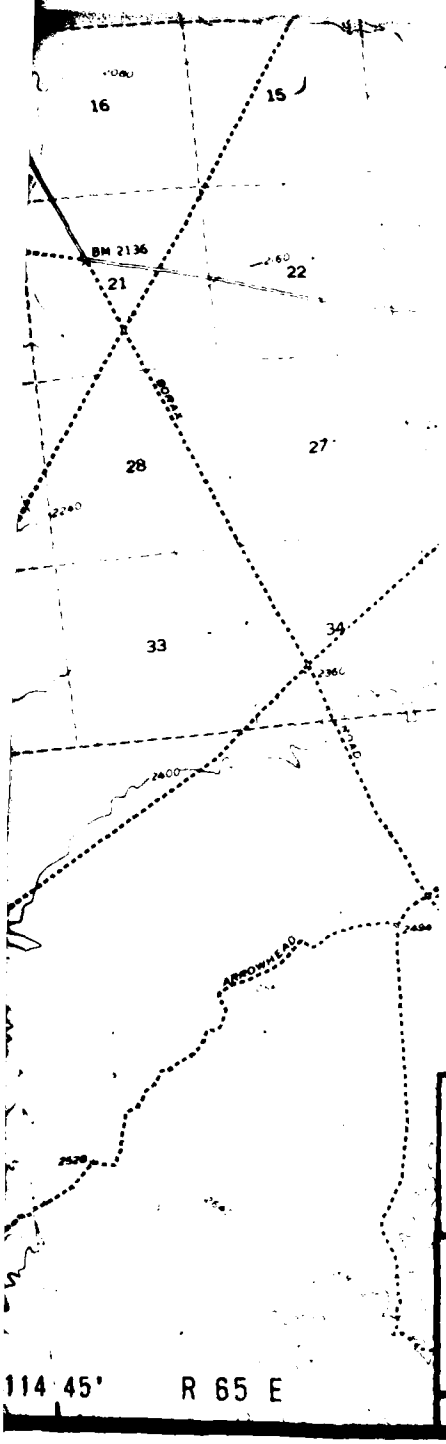

T 16 S
T 17 S
EXPLANATION
NEW RAILROAD


36° 30'
T 17 S
T 18 S
R 61 E
SCALE 1:62,500
STATUTE MILES
KILOMETERS


SCALE 1:62,500
1 2 3
STATUTE MILES
0 1 2 3
KILOMETERS
R 62 E
115 00
31
32
5
7
8
9
16
17
18
19
20
21
30


DRY LAKE
R 63 E
R 64 E


DRY LAKE
R 64 E
114 45'
R 65 E
BM 2081
BM 2094
BM 2088
BM 2136
BM 2103
PACIFIC
UNION
California
ARROWHEAD



EXPLANATION

T 17 S

[redacted] NATIONAL TRANSPORTATION NETWORK
[redacted] WHERE COINCIDENT WITH MX

NEW RAILROAD
ALTERNATIVE ALIGNMENTS

BUREAU OF LAND MANAGEMENT (BLM)

NATIONAL WILDLIFE RANGE WITHDRAWAL APPLICATION

DESERT LAND ENTRY APPLICATION

PRIVATE PROPERTY

MATERIAL SITE (STATE OR COUNTY)

INDIAN RESERVATION

NATIONAL WILDLIFE RANGE OR REFUGE

T 18 S

OPERATIONAL BASE LAYOUT OPTION 1

COYOTE SPRING/KANE SPRINGS VALLEYS, NEVADA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - BMO

DRAWING
7-1

FUGRO NATIONAL, INC.


ATE
MED